1851-03454

A Planning Document Prepared for:

AEROJET

Post Office Box 3530
Rancho Cordova, California 95741-3530

REVISED WORK PLAN
AZUSA/IRWINDALE STUDY AREA SITE ASSESSMENT
SAN GABRIEL VALLEY
LOS ANGELES COUNTY, CALIFORNIA

HLA Job No. 13117,019.02

Harding Lawson Associates
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1851-03454

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William L. Berry, Jr.
Senior Counsel

September 16, 1991

Mark Klaiman, Esq.
Assistant Regional Counsel
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Re: San Gabriel Valley Superfund Sites, Azusa/Irwindale Study Area

Dear Mr. Klaiman:

We are transmitting herewith a final revised Work Plan for the Azusa/Irwindale Study Area Site Assessment. This Plan, which replaces the one dated August 5, 1991 transmitted by my letter to you of August 2, 1991, takes account of the comments made and understandings reached in the meeting of Aerojet, EPA and Regional Board representatives in EPA offices on August 22, 1991, and in an August 23 telephone conference of those representatives.

Pursuant to my discussion with you at the August 22 meeting, Peter Taft and I stand ready to work with you on the administrative steps for transferring lead agency control to the Regional Board, as soon as this revised Work Plan has been reviewed and approved by the agencies. Also, as previously arranged, Aerojet will process payment for past EPA costs upon ten days' notice of the date of transfer.

Very truly yours,

William L. Berry, Jr.

Enclosure

cc: G. Kistner, Remedial Project Manager, EPA
N. Ziemba, San Gabriel Team Leader, EPA
R. Sakaida, Ph.D., Sr. Wtr. Res. Cont. Engr., RWQCB
B. Hausknecht, CH2M Hill

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September 17, 1991

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1.0 INTRODUCTION

This revised Work Plan has been prepared for Aerojet by Harding Lawson Associates (HLA) with assistance from Meredith/Boli & Associates, Inc., to describe work activities proposed to be performed as part of the Azusa/Irwindale Study Area (AISA) Site Assessment, Los Angeles County, California. The proposed scope of work has been developed in response to the *California Regional Water Quality Control Board - Los Angeles Region (RWQCB), Statement of Work (SOW), Azusa/Irwindale Study Area, San Gabriel Areas 1-4, Los Angeles County, California,* dated May 16, 1991, and a subsequent meeting and teleconference attended by Aerojet, HLA, the RWQCB, and the U.S. Environmental Protection Agency - Region IX (EPA) on August 22 and 23, 1991, respectively. The *SOW* was submitted to Aerojet by the EPA. The purpose of the August 22-23 meeting and teleconference was to discuss modifications to the August 5, 1991, *AISA Work Plan* previously submitted by Aerojet to the RWQCB and the EPA.

This revised Work Plan is submitted to the EPA and the RWQCB in accordance with the terms described in the *SOW*, and subsequent modifications to the *SOW* and the August 5, 1991 *AISA Work Plan* that were discussed and mutually agreed to by Aerojet, the RWQCB, and the EPA on August 22 and 23. In general, the nature of these modifications has resulted in a Work Plan that presents an expanded scope of work to investigate additional locations within the AISA and to expand the suite of chemical analysis for soil gas, soil, and groundwater characterization. This expanded scope of work has evolved primarily due to the lack of detailed documentation regarding historical activities within the AISA. It has further been agreed that an attempt will be made by Aerojet to summarize additional details and/or documentation that can be obtained regarding historical records and activities within the AISA, and that such information will be used to modify the 5-year increment plot plans and/or discussion of the AISA Inventory and History presented in Sections 1.1.2 and 1.1.3 of this Work Plan. Because such information would not change the scope of work presented in this Work Plan, any additional information will be submitted to the RWQCB in advance of any future site assessment activities proposed beyond the present scope of work.

The objective of the AISA Site Assessment is to collect sufficient data to assess the presence or absence of chemicals in surface sediments, subsurface gases, vadose zone soil, and groundwater in the vicinity of the AISA. The data will be used to evaluate the physical and chemical conditions that exist within the AISA.

Following approval of this Work Plan, additional planning documents to be submitted to the RWQCB for approval prior to implementation of the AISA Site Assessment field program will include:

- Sampling and Analysis Plan (SAP)
- Quality Assurance Project Plan (QAPP).

These additional planning documents will include most of the detailed technical criteria that will control the execution of the work. The following sections of this work plan address the elements outlined in the *SOW*.

1.1 Physical Setting and Facility History

1.1.1 Physical Setting

The AISA comprises approximately 125 acres in the cities of Azusa and Irwindale in the north-central portion of the San Gabriel Basin, Los Angeles County, California. The study area lies at the base of the foothills of the San Gabriel Mountains near Fish Canyon, approximately 1.5 miles east of the San Gabriel River/Santa Fe Flood Control Basin, immediately east of Irwindale Avenue, and just south of Interstate Highway 210

(Plate 1). Aerojet proposes to extend the western boundary of the AISA as presented in the *SOW* to also include the entire area adjacent to the east side of Irwindale Avenue, between the northern and southern boundaries of the AISA, as shown on Plate 2. The AISA properties currently include office, industrial, and research buildings, and concrete and/or asphalt roadways and parking areas. The north boundary of the AISA encompasses portions of the former, partially backfilled gravel pit known as the Kincaid Pit, that is now crossed by Highway 210. The south-central margin of the AISA consists of portions of the Azusa Land Reclamation Company gravel pit and landfill. Plate 2 shows the current topography of the AISA and of the neighboring gravel pits.

The AISA primarily contains industrial property. Neighboring activities include, but are not limited to: residential housing; landfill and wrecking yard operations; gravel mining; chemical product and paint manufacturing; automotive repair; metal forging and machining; urethane-based products manufacturing; and waste oil and solvent recycling and processing.

1.1.1.1 Regional and Local Geology

This section describes the regional and local geologic conditions in the San Gabriel Basin, based primarily on information published by the California Department of Water Resources (*CDWR, 1966*). The discussion focuses on characterization of the water-bearing deposits that comprise the groundwater basin.

The San Gabriel Basin is a broad piedmont plain in eastern Los Angeles County that slopes from the San Gabriel Mountains toward Whittier Narrows (Plate 3). The San Gabriel Mountains range in elevation from approximately 900 feet at their base to over 10,000 feet above mean sea level. The mountains are composed primarily of igneous and metamorphic rocks and are characterized by steep, rocky ridges broken by numerous irregular canyons.

The San Gabriel Valley Groundwater Basin, as defined by the CDWR, is an alluvial valley bounded on the northwest by the Raymond fault; on the north by the line of contact between the alluvium and the bedrock of the San Gabriel Mountains; on the east by the bedrock high between San Dimas and La Verne; and on the west and south by the Repetto, Merced, La Puente, and San Jose hills. Faults that influence the flow of groundwater into the basin include the Raymond fault and faults of the Sierra Madre system, in particular, the Duarte and Cucamonga faults and another unnamed fault.

1.1.1.2 Regional and Local Hydrogeology

The water-bearing formations that comprise the San Gabriel Valley Groundwater Basin are primarily unconsolidated and partially consolidated nonmarine sediments of Recent and Pleistocene age, but they also include marine sediments of probable Pleistocene and late Pliocene age. These water-bearing deposits predominantly consist of coarse sand, gravel, and boulders close to the mountain front, with increasing percentages of finer-grained sediments with increasing distance away from the mountains. These deposits are reported to have a maximum thickness of over 4,000 feet near the center of the basin.

Under natural conditions, prior to extensive pumping of groundwater for agricultural, municipal, and industrial uses, groundwater generally moved south from the northern basin perimeter, toward the Whittier Narrows. The effect of regional pumping, however, is particularly evident near the cities of Alhambra, San Gabriel, and West Covina, where pumping depressions have become prominent features in the groundwater surface of the basin. Sources of groundwater in the basin include precipitation, surface water, delivered water applied at spreading grounds, and subsurface inflow of groundwater from adjacent basins. Groundwater is extracted from the basin through wells and leaves the basin through Whittier Narrows as both subsurface outflow and groundwater discharge to the San Gabriel River and the Rio Hondo.

Regional information for the AISA vicinity indicates that coarse gravels, sands, and boulders over 2 feet in diameter extend to about 800 to 1,000 feet, below which are granitic and metamorphic basement rocks. The alluvial materials are reported to comprise a single major aquifer unit in the AISA vicinity. The aquifer system is believed to be vertically continuous and is characterized as unconfined.

The historical depth to groundwater in the general vicinity of the AISA is reported to range from about 200 to 350 feet below ground surface (bgs). Over the past 5 years, water levels in the vicinity of the AISA have continued to decline as a result of drought conditions. The local direction of groundwater flow is reported to vary from west to southeast and is apparently influenced by precipitation, water spreading at the Santa Fe Spreading Grounds, and groundwater pumping activities. The predominant local direction of groundwater flow in the vicinity of the AISA is reported to be south-southwest.

Pumped groundwater reportedly represents over 90 percent of the total water supply in the San Gabriel Basin.

1.1.1.3 Regional and Local Surface Hydrology

The surface water features of San Gabriel Valley include the San Gabriel River, Rio Hondo, and their tributaries. These streams originate in the San Gabriel Mountains, from which the major portion of their runoff is derived. Almost all natural surface outflow from San Gabriel Valley exits through Whittier Narrows, the exceptions being small amounts that exit through two low gaps in the Repetto Hills, south of Monterey Park, and minor amounts that pass over the eastern portion of the basin boundary near La Verne. From the mouth of San Gabriel Canyon near Azusa, the San Gabriel River traverses the valley in a southwesterly direction, passes through Whittier Narrows, and extends across the coastal plain to the Pacific Ocean near Seal Beach. Rio Hondo drains the northwestern portion of the San Gabriel Valley, passes through Whittier Narrows, and ultimately discharges into the Los Angeles River, which in turn empties into San Pedro Bay near Long Beach.

The Los Angeles County Department of Public Works (DPW) operates 20 spreading grounds in the San Gabriel Valley for recharge of local aquifers to increase groundwater supplies (*DPW, 1990*). These spreading grounds receive direct valley runoff from the San Gabriel Mountains; some also receive imported water. The largest artificial recharge facility in the San Gabriel Basin is the Santa Fe Reservoir Spreading Grounds, just south of the mouth of San Gabriel Canyon and approximately 1.5 miles west of the AISA. The main San Gabriel groundwater basin and in particular the local hydraulic system in the AISA is reported to be influenced significantly by artificial recharge activities at the Santa Fe Reservoir Spreading Grounds and by infiltration from the San Gabriel River downstream of the Santa Fe Dam.

In general, natural surface water runoff in the AISA is to the south. However, localized drainage patterns have been altered by artificial drainage systems, roadways and pavement surfaces, and gravel mining operations along the southern margin of the AISA.

1.1.2 AISA Inventory

Aerojet first occupied a portion of the AISA in 1943. Prior to 1943, Aerojet has no specific knowledge of activities within the AISA. Because Aerojet has never occupied the entire AISA, and for substantial periods of time since 1943 has owned and/or occupied less than one-half of the study area, it has not been possible for Aerojet to provide detailed information regarding the progression of construction and development within the AISA over time. However, in Appendix A to this Work Plan, Aerojet has provided a series of 5-year increment plot plans that represent the changes in Aerojet's facility from 1955 through the present, and corresponding tables that present an inventory of buildings and land within the AISA that have been occupied by Aerojet. Table A1 presents the year each Aerojet building was acquired and the year it was demolished or released, and also identifies the general use of each building. Table A2 presents the divestiture of Aerojet land and buildings starting in 1973 which reduced Aerojet's holdings in the AISA to their present extent of approximately 47 acres. These tables summarize all of the available relevant data on these two topics.

In addition to the 5-year increment plot plans and building inventory and land divestiture tables, a narrative describing Aerojet's occupancy of the AISA is presented in Section 1.1.3, and detailed descriptions of previous chemical investigations conducted within the AISA at Aerojet-owned or Aerojet-operated facilities are presented in Section 1.1.4. Detailed descriptions of features of interest identified within the AISA, based on the *SOW*, preliminary aerial photograph review (Section 1.1.5), and Aerojet's 1983 and 1988 3007/104(e) response documents, are presented in Appendix B.

1.1.3 History

Using the *SOW's* general guidance of "5-year increments," the following subsections describe Aerojet's activities within the AISA. The "5-year increments" have been revised somewhat to better reflect significant dates of Aerojet activities.

Prior to 1943

Aerojet's knowledge of the AISA prior to 1943 is very limited. The Aerojet Engineering Corporation was incorporated in March 1942 to accelerate and augment jet propulsion research and development being carried out at that time by the Guggenheim Aeronautical Laboratory Group of the California Institute of Technology. The company was organized to develop and produce jet propulsion devices. The company was established in Pasadena, California, and although the company was incorporated in March 1942, no machine shop equipment was available at the Aerojet Azusa plant until the middle of 1943. At that time, a Day & Night Manufacturing Company (Day & Night) facility was located directly west of the original leased property occupied by Aerojet (see below) and the Day & Night facility extended west to Irwindale Avenue. This facility was producing and testing military photo-flash bombs (*Aerojet, 1983*, page 2).

1943 to 1947

Beginning in 1943, a 49-acre site in Azusa (completely within the AISA; see Exhibit 6, Drawing 1 [*Aerojet, 1983*]) was developed and used by Aerojet on behalf of the War Assets Administration and the Defense Plant Corporation for mixing solid propellants and testing rocket motors (*Aerojet, 1983*, pages 1-2). The initial production contract was for 5,000 rocket motors (including 200 liquid propellant motors). These jet-assisted takeoff (JATO) motors were very small and often referred to as "bottle rockets".

Historical information indicates that some space may have been rented from the contemporaneous Day & Night facility west of the Aerojet-leased property (but still within the AISA); this has not been confirmed (*Aerojet, 1983*, Exhibit 6, Drawing 2). In 1946, land adjacent to, and east of, the Aerojet-leased facility was purchased from Azusa Foothill Citrus Company. Property north of the Aerojet facility was leased on a month-to-month basis from Consolidated Rock Company in May 1947 for burning small quantities of waste solid propellant. In addition, a buffer strip on the south side of the Aerojet facility was leased from Azusa Rock & Sand in 1947 (*Aerojet, 1988*, Attachment A to Question 1.a).

The types of facilities rented or constructed by Aerojet generally were office, laboratory, materials storage, and test area buildings of simple construction. Solid and liquid propellant rocket research, development, and production operations took place at the facility. Initial rocket development and testing operations took place in the north central portion of the AISA (*Aerojet, 1983*, Exhibit 6, Figure 2, and *Aerojet, 1988*, Question 1.e.(5)), and development of the "Proving Grounds" in the southeast portion of the AISA began soon after site occupancy in 1943 (*Aerojet, 1988*, Question 1.c.(2)). The term "Proving Grounds" has been used by Aerojet to identify an area occupied by rocket/equipment test stands and associated buildings. By 1947, substantial development of the Aerojet facility had taken place, with many buildings completed, including several Proving Grounds, test stands with support buildings, the small ring channel (the large ring channel was under construction), and other facility improvements.

The primary chemicals used in onsite activities were the components of rocket fuel. Solid rocket fuels consisted of a petroleum-based (e.g., asphalt and motor oil fuel) binder material and oxidizers such as potassium perchlorate. The liquid fuels consisted of an oxidizer (usually red fuming nitric acid or nitrogen tetroxide) and a fuel (such as aniline, furfuryl alcohol, or petroleum derivatives [*Aerojet, 1983*, page 2]). Various other chemicals were used in small quantities in the laboratories, and solvents (including carbon tetrachloride, CCL4 or CTC) were used in metal parts cleaning and degreasing operations. No data are available that would allow estimation of volumes of any of the materials noted. Chemical and material storage was in revetted bunkers (for potentially explosive materials) and in drums or smaller containers in designated areas (*Aerojet, 1988*, Question 1.d.). The only waste disposal by Aerojet onsite or in nearby areas that Aerojet has been able to document is the disposal by open burning of solid rocket fuel wastes (*Aerojet, 1988*, Questions 1.e., 8 and 10). Excess liquid propellant materials were reportedly returned to manufacturers in their original containers.

Stormwater runon and runoff was by gravity in historical natural channels or manmade open ditches. Water from "swamp coolers" used for indoor cooling also drained from the site by gravity (*Aerojet, 1988*, Questions 1.b. and 5). As described in Section 1.1.4, other liquid wastes were managed via leach pits and leach beds (for laboratory and industrial wastes) and septic tanks with leach fields (for sewage) at various locations around the site.

During this time, areas of interest for possible inclusion in the site assessment were drum storage areas, offsite drainage pathways, a propellant burn area, and identified leach pits and leach beds (*Aerojet, 1988*, Question 1.e.(3)). These locations, and a possible waste disposal area in the north-central portion of the site, were identified by EPA as areas of interest on Figure 2.1 of the *SOW*. No data are available regarding product and/or waste sampling and analysis from this time period.

1948 to 1953

The original facility leased by Aerojet from 1943 through 1947 was purchased by Aerojet in 1948 from the U.S. Government Reconstruction Finance Corporation. Property west and northwest of this Aerojet property was leased from E.K. Metzner in 1949. Additional acreage to the south was purchased from Davis Realty Company in 1950. These transactions are documented in more detail in the 1988 Aerojet 3007/104(e) response (e.g., Attachment A to Question 1.a.). During this period, the facility encompassed approximately 76 acres (*Aerojet, 1983*, page 3).

Construction of office, laboratory, materials storage, and Proving Grounds facilities for rocket motor research and development continued at a rapid pace. A small machine shop and garage (Building 136) was built in the late 1940s and a trichloroethene (TCE) degreaser was installed in an adjacent structure (*Aerojet, 1983*, page 3). By 1953, the Proving Grounds had been substantially developed. For example, the research laboratories and propellant storage facilities in the center of the AISA (i.e., between the historical Central and West avenues) were essentially complete, major new office (including Building 59) and manufacturing buildings (including the Building 57 machine shop) were complete, support facilities such as Buildings 118, 119, and 142 were in place, and the bunkered magazines (referred to as the "Special West Area") were constructed west of West Avenue for storage of explosives (*Aerojet, 1983*, page 4).

During this period, the population of the Los Angeles area expanded into the San Gabriel Valley. In an effort to find a more remote area for rocket motor production and testing, Aerojet purchased 7,300 acres of property east of Sacramento in 1950. Relocation of liquid and solid rocket motor operations from Azusa to Sacramento began in 1951 (*Aerojet, 1983*, page 4).

Of particular importance to the facility in terms of infrastructure development was the completion, in 1952, of the industrial waste treatment/sewer system serving the majority of the Aerojet facility as it existed then. The onsite treatment plant discharged via pipeline to an industrial sewer under Irwindale Avenue. Efforts to develop this system had begun in 1949 (see the response to *Aerojet, 1988*, Question 1.b.(11)); however, a permit to discharge into the industrial line was not obtained until 1952. Elimination of other waste disposal systems is described on a case by case basis in this report.

Rocket-fuel related chemicals continued to be the primary chemicals used onsite. Carbon tetrachloride was used for cold cleaning solid rocket motor components from 1947 to 1953; however, its use was discontinued due to employee health risk concerns (*Aerojet, 1988*, Question 1.d.(3)). No documentation of chemical use, storage, or disposal volumes during this period has been located by Aerojet. Hazardous and chemical substance and waste storage areas during this period were specified in the 1988 response to Question 1.d. *(Aerojet, 1988)*, and are shown on Plate 4.

Water runon and runoff from open areas of the facility continued to be managed by local infiltration in open areas, and by gravity drainage (by natural or manmade channels) to leach ponds. Runoff from operational areas was managed via the industrial waste collection and treatment system after 1952.

Aerojet waste practices included offsite recycling of solvents and offsite disposal of solid and industrial wastes (*Aerojet, 1983*, pages 17 - 19, and Exhibit 5, page 27). Burning of solid rocket propellant waste in the gravel pit (Kincaid Pit) at the northwest corner of the AISA continued during this time frame. Propellent burn quantities and times were limited under the authority of a Los Angeles County Air Pollution Control District Permit, and all burn activities were monitored (*Aerojet, 1983*, Exhibit 7).

1953 to 1958

Transfer of rocket production and testing operations from Azusa to Sacramento was completed in 1958. Rocket motor and propellant research and development continued to be a significant onsite activity in Azusa, but a variety of other research and manufacturing processes also occurred onsite. Among the most significant activities during this period and until 1968 were: production of high energy propellant additives, torpedo and anti-torpedo programs, power generation using eutectic sodium, potassium, and mercury, and the development, assembly, and testing of electro-optical sensing devices and sensors (*Aerojet, 1983*, page 5).

The Aerojet-occupied property expanded to the northwest and southwest (to Irwindale Avenue) through leases from E.K. Metzner (who also had a variety of operations in the AISA prior to and after Aerojet occupancy), to the south with purchases from Azusa Rock & Sand, and to the east with purchases of small residential lots (*Aerojet, 1988*, Attachment A to Question 1.a.).

Facility growth emphasized expansion and new construction of office space, research labs, and manufacturing buildings. Upgrading of additional facilities was also significant. Building 159, now occupied by Optical Radiation Corporation (*Aerojet, 1988*, Questions 1.b.(10)), and Building 163 were built in 1957 to support the fiberglass and composite materials structure manufacturing operations. A 5,000-gallon aboveground tank for TCE storage also was built in 1957 adjacent to Building 136, but was never used (*Aerojet, 1988*, Question 1.d.(1)). The number of laboratories, etc., connected to the industrial sewer continued to increase through this period. A sanitary sewer system, which replaced historical septic tanks, was constructed in 1956-1957. Septic tanks and leach pits were taken out of service, pumped dry, and backfilled (*Aerojet, 1988*, Questions 1.d(8) and 1.e.(2)).

Chemical use onsite and its associated waste generation changed with changes in facility operations. However very little documentation has been located to identify specific chemicals or wastes, and related volumes of use or disposal (via the industrial waste treatment system or offsite waste management/recycling). Various acids (nitric, hydrochloric, etc.) were used in research, testing, and analytical operations (*Aerojet, 1988*, Question 1.d.(5)). During this period, several degreasers using TCE were in operation at various locations (Buildings 57, 136, and 159, among others) on the Aerojet property. TCE was also used for cold cleaning mandrels in the composite structure operations at Buildings 159 and 163 (*Aerojet, 1988*, Question 1.d.(1)).

Management of rainwater and cooling water continued to be based on gravity flow offsite to the south. An additional leach bed (LB-1) was constructed to allow for collection and management of these waters (*Aerojet, 1988*, Question 5).

Suspected or potential areas of contamination that will be investigated from this period (1953 to 1958) include onsite open-air or enclosed chemical storage and use areas, leach pits, leach beds, and areas inside the Proving Grounds. The leach pits and septic tanks were phased out during this period. No sampling or analysis data for wastes or products have been located from this period.

1959 to 1962

The Aerojet facility continued to grow to the west (i.e., the property previously leased from E.K. Metzner) and east (small residential lots) via property purchases in 1959 and 1961. Additional land bordered on the west by Irwindale Avenue also was leased from E.K. Metzner in 1961. Property on the far southeast corner of the present

Aerojet facility was leased from Azusa Rock & Sand from 1961 to 1964 for automobile parking (*Aerojet, 1988*, Attachment A to Question 1.a.).

Additional facility structure additions and improvements included completion of the Special West Area, expansion of Buildings 57, 59, 159, and 160, construction of Buildings 175 and 183, and improvements and additions to the Proving Grounds and laboratory area. All of this growth occurred in non-rocket motor business areas, with the exception of continued research and development of fuels and related equipment. Other more diversified and high technology operations were being expanded for small-scale research projects.

The various E.K. Metzner properties not occupied by Aerojet during this period also had substantial activities during this (and preceding) periods, as noted on the aerial photographs available to Aerojet. A go-cart race track, fertilizer/agricultural product processing, and an automobile wrecking yard are visible on aerial photographs provided in Question 15, Attachment A of the Aerojet, 1988, 3007/104(e) response.

1963 to 1968

There were few physical changes to the Aerojet-owned and/or Aerojet-occupied facilities during this period. Certain of the properties (on the southwest side of the AISA) originally leased from E.K. Metzner were purchased in 1967. With this purchase, the property owned by Aerojet within the AISA reached its maximum size of approximately 94 contiguous acres (*Aerojet, 1988*, Question 1.a.).

A small property on the far northeast side of the AISA was leased from Wynn Oil Company for automobile parking in 1963 and 1964. Other property in the far northeast corner of the historical Aerojet property was bought from, or sold to, the State of California which was developing the I-210 Freeway (*Aerojet, 1988*, Attachments A and B to Question 1.a.). The I-210 has been incorporated into the AISA on the northeast, but merely serves as the northern boundary of the AISA in the northwest and north-central portions of the AISA.

Buildings 199 and 200 were built to support research and testing operations as Aerojet evolved into a high technology research and development company, with low quantity production-oriented activity in support of the nation's space program. A 1,000-gallon underground holding tank for rinsewater containing organic solvents was installed at the north side of Building 200; it was removed in 1982 (*Aerojet, 1988*, Question 1.d.(3)). A salvage and storage yard was developed near Building 166 in the south-central portion of the facility (on the old Metzner property) and was in service from 1963 to 1970. The aboveground storage tank that was originally built to hold TCE at Building 136 was removed in 1966, without ever having been used (*Aerojet, 1988*, Question 1.d(1)).

The primary change in facility activities during this period was the final transfer of all rocket propellant research and development (R&D) activities to the Sacramento facility in 1968. In 1965, waste solid rocket fuel burning in the Kincaid Pit was discontinued (*Aerojet, 1983*, Exhibit 7, and *Aerojet, 1988*, Question 1.e.(10)).

TCE use was regulated under stringent air pollution control regulations in approximately 1967; Aerojet switched to alternative solvents (including perchloroethene [PCE] and 1,1,1-trichloroethane [TCA]) for degreasing operations. Also at that time, with the phasing out of certain projects, degreasing operations began to be substantially reduced throughout the Aerojet facility.

1969 to 1972

Beginning in 1968, the evolution of the Aerojet Azusa facility from rocket fuels and rocket motor operations to other high technology research, development, and production was completed. Aerojet's activities at the Azusa facility were then in the electronics field, focusing on research and development of semiconductors and the assembly and testing of space sensors (*Aerojet, 1983*, page 8). This evolution was recognized by a name change in 1972 to Aerojet ElectroSystems Company. Of particular note was the demolition, in 1971, of the Proving Grounds and supporting facilities such as the Ring Channels, Building 136, the Special West Area, and the original facility structures between West Avenue and Central Avenue in the west-central portion of the AISA. Use of leach beds B and C (identified as LB-2 and LB-4 in the *SOW*) was discontinued in 1970. Other facility changes included relocating the industrial waste treatment plant (*Aerojet, 1988*, Question 1.b.(11)) and a 10,000-gallon underground gasoline storage tank (T-5, originally located near Building 136) to their respective present locations near the corner of Third Street and Central Avenue (now named Aerojet Avenue).

The vacant properties west of Central Avenue resulting from the demolitions noted above, as well as certain "surplus" Aerojet buildings (57, 119, 157, and 163), were transferred to the real estate and property management arm of Aerojet (Aerojet Investments Limited [AIL]) for conversion to more productive use. The Proving Grounds were transformed into employee parking. At this point, the "active" Aerojet-owned and Aerojet-occupied properties comprised approximately 47 acres (*Aerojet, 1983*, page 8).

Site operations continued their evolution into high technology computer, satellite, and other R&D activities, with limited production and a reduction in chemical use.

Degreasing operations were reduced in scope (e.g., smaller units, a reduction in the volume of solvents).

Hazardous material storage was reduced substantially and centralized at Buildings 50 and 96. These two buildings were relocated to their present location at the northeast corner of the Aerojet property in 1969 (*Aerojet, 1988*, Question 1.d.). A release of mercury occurred in mid-1971 near Buildings 186, 187, and 156 (*Aerojet, 1988*, Question 1.j.).

1973 to 1981

The Aerojet Azusa facility continued to emphasize electronics-based research, development, and limited production in support of the nation's space program and other government clients. This period was characterized by a continued reduction in the size of the active areas at the Aerojet Azusa facility.

As documented by Aerojet (see Question 1.a., Attachment B, *Aerojet, 1988*), during this period AIL leased Aerojet buildings as follows:

- 57 - to a variety of tenants, who used the space for a variety of activities including storage of building materials, warehousing, vending machine storage, and manufacturing of bedsprings, among others
- 119 - to Ioptex
- 159 - to Optical Radiation Corporation (ORC)
- 163 - to Johnston Pump Company.

Also, from 1976 to 1981, various properties west of Central Avenue were sold to:

- Reichhold Chemical Company (Reichhold) -- 1976 and 1979
- ORC -- 1977 and 1981 (*Aerojet, 1988*, Questions 1.a., Attachment B).

Other properties in the far western portion of the AISA were acquired by the City of Irwindale Community Redevelopment Agency (CRA) by:

- Purchase from AIL (1979)
- Dedication of street rights-of-way from AIL (1978 and 1981)
- Purchase from E.K. Metzner in 1977 and 1987 (*Aerojet, 1988*, Question 1.a., Attachment B).

The Reichhold, ORC, and CRA properties have subsequently been extensively developed, utilized, and transferred to (or occupied by) other parties. This development is reflected in the most recent EPA AISA potentially responsible parties (PRP) list (March 19, 1991).

In 1979, a leak was discovered in a pipeline leading from a Building 53 laboratory to an underground tank north of Building 53. The tank had been installed in 1972. Twenty cubic yards of dirt contaminated with up to a maximum detected concentration of only 420 ppb TCE were removed and disposed offsite (*Aerojet, 1988*, Question 1.d.(1) et al.).

1982 to Present

Aerojet's emphasis on high technology, computer-based R&D activities, with limited production of scientifically complex products, has continued to the present. This emphasis has continued to result in an associated reduction in solvent and chemical use as compared to earlier periods. Implementation of environmental requirements (including air, water, and hazardous waste regulations at the regional, state, and federal level) has included:

- The construction of Building 202 for hazardous waste storage in the northeast corner of the Aerojet property (1982)
- Application for and receipt of state and federal hazardous waste management permits and interim status (1983)

- Timely removal or retrofitting of underground tanks (1982, 1985, and 1986)
- Use of vapor degreasers using Freon and Lonco 113 solvents (which exhibit lower volatility characteristics than solvents used previously).

Facility boundaries stayed constant during this period, but building occupancy has continued to evolve toward computer rooms, clean rooms, and engineering offices. Buildings 1 and 2 are the only new buildings, and are located in the north-central and south-central parts of the AISA, respectively. Some buildings previously leased to others have been reoccupied by Aerojet, including:

- Building 57 -- in 1984
- Building 119 -- in 1990 (now being remodeled)
- Building 163 -- in 1989.

Solvent use and purchase amounts are documented for the 1983 to 1988 period in the Response to Question 2 (*Aerojet, 1988*). At present, solvent use is very limited, with emphasis on small quantity, laboratory grade purchases. Offsite hazardous waste management and disposal is performed in compliance with state and federal laws and regulations (*Aerojet, 1988*, Question 20).

Summary

In summary, research and testing operations at the Aerojet Azusa facility first began in 1943 when a 49-acre site was leased and developed by Aerojet on behalf of the War Assets Administration and the Defense Plant Corporation for the purpose of mixing solid propellants and testing rocket motors. Rocket production and testing operations were discontinued at the facility in 1958. Throughout most of its history, the Azusa facility has been used as a high technology research, design, and production center serving markets in aerospace and defense. Current and historical activities at Aerojet have complied with appropriate state and federal laws and regulations, and reflected technologies of the period. Current use of hazardous materials at Aerojet's Azusa facility is controlled, minimal, and in compliance with appropriate regulations. Detailed accounts of the history of operations and a chronology of events at the Aerojet Azusa facility have previously been submitted to EPA by Aerojet in accordance with U.S. EPA 3007/104(e) Information Request Letters (*Aerojet, 1983, 1988, and 1990*). Reference to those documents provides a more complete history of the Aerojet Azusa facility. Aerojet does not now, nor has it ever, occupied the entire AISA. Several areas of the AISA where Aerojet was an owner or lessee have been controlled by other entities prior to and/or subsequent to Aerojet control of such property.

1.1.4 Previous Investigations and Remedial Work

1.1.4.1 Regional Investigations

On a regional scale, volatile organic compounds (VOCs) in groundwater were first detected in the San Gabriel Basin in 1979 when TCE was identified in a Valley County Water District well near Azusa. In 1984, four broad areas of VOC contamination within the basin were listed as San Gabriel Areas 1-4 on the EPA National Priorities List (NPL). The four areas were defined on the basis of water quality data available at the time of listing. Subsequent water quality sampling has shown that VOC contamination is present in many areas of the San Gabriel Basin. The entire San Gabriel Basin has been further subdivided into seven remedial investigation (RI) areas that include NPL Areas 1-4. The AISA is located in RI Area 5.

Over 400 water supply wells are operated in the basin by water purveyors to extract groundwater that is used for industrial, commercial, and residential purposes. Water purveyors with contaminated wells have been required either to take those wells out of production, employ treatment measures, or blend the contaminated water with other water to ensure that the contaminant concentrations in water provided to their customers are below health-based state action levels.

1.1.4.2 Investigations Within the AISA

With the exception of limited investigations performed within the current property boundaries of the Aerojet Azusa facility, no additional information has been available regarding investigations performed by other PRPs within the AISA. Removal and investigation of the Johnston Pump Company (JPC) sump from Building 163 is currently being conducted at the request of, and under the regulatory direction of, the Los Angeles County Department of Public Works. This investigation is being conducted separately from the AISA Site Assessment. The data obtained and evaluated during the JPC sump investigation will, however, be incorporated into the AISA Site Assessment and the corresponding report, as appropriate.

Aerojet is not aware of surface water, soil gas, soil, or groundwater investigations, samplings, or routine monitoring events within the AISA except for those that have been previously identified in the 1983 and 1988 3007/104(e) response documents submitted to EPA (*Aerojet, 1983, 1988*) or that have occurred since the 1988 3007/104(e) response document was submitted and are described here. These include investigations or routine monitoring events conducted for:

- Removal from service of underground tanks, piping, and sumps (preremoval and postremoval soil sampling and analysis), and
- Sampling and analysis of soil, surface water, and potential sources of chemicals such as sewer effluents and tank contents. No soil gas or groundwater investigations have been conducted by Aerojet at the Azusa facility.

The following sections summarize the results of these investigations.

1.1.4.2.1 <u>Building 53 Liquid Waste Tank (T-3) and Drain Pipe Areas</u>

A local source investigation of shallow soil was conducted in response to the 1979 discovery of a leaking underground floor drain line that was connected to a 1,250-gallon underground holding tank on the north side of Building 53 (Tank T-3 [Plate 4], see Section 1.1.6 and Appendix B). Tank T-3 was constructed of concrete with a plastic lining. The tank was installed in 1972 to collect wastes originating from a laboratory that used small quantities of heavy metals, acids, and solvents (alcohols and TCE) diluted with reportedly large volumes of water in accordance with typical chemical laboratory practice (*Aerojet, 1983*; pages 30-31; Exhibit 1, page 345; Exhibit 4 summary). This tank was pumped out 1 to 3 times a year by a registered hauler; the contents were taken to an offsite Class I landfill for disposal (*Aerojet, 1983*, Exhibit 4, pages 76-81). The subsurface investigations performed at T-3 were conducted under the direction of the Los Angeles County Department of Health Services, and included the following:

- Samples of soil were collected on September 7, 1979, by Analytical Research Laboratories, Inc., (ARLI) for Aerojet. Two soil samples were collected at each of two sites and composited into one representative sample from each site. Samples 1 and 2 (Site No. 1) were collected from a depth of 21 inches below floor level along the west wall of Room 44, Building 53. Samples 3 and 4 (Site No. 2) were collected at 45 inches below surface level near the tank (*Aerojet, 1983*, Exhibit 1, pgs. 343, 344). Soil samples were analyzed by ARLI for TCE, tin, lead, and arsenic. Results are presented in Table 1.

- Additional soil samples were collected on September 17, 1979. Samples 5 and 6 were collected with a trowel at a point 40 inches below floor level in a hole dug in the floor of Room 44, Building 53. Samples 7 and 8 were collected outside Building 53 at a point 19 feet from the north wall, 0.5 feet from the curb, and at a depth of 61 inches. These soil samples were analyzed for TCE (*Aerojet, 1983*, Exhibit 1, pages 349, 350). Results are presented in Table 1.

- Subsequent to these investigations, additional samples were collected by Aerojet personnel from Site No. 2 to evaluate how far down the materials had leached into the ground. Four soil samples were collected from two locations; one sample from each location was analyzed by ARLI. Sample 10 was collected at Site No. 2, 19 feet from the north wall of Building 53, and 108 inches below the pad. Sample 12 was collected from the same location, 132 inches below the pad (*Aerojet, 1983*, Exhibit 1, pages 346, 353). Both samples were analyzed for TCE by GC/MS. No analyses were performed on Samples 9 and 11. Results are presented in Table 1.

Following discovery of the leaking drain line, the following remedial actions were also conducted:

- Removal of all tank fluids and disposal of these liquids at a licensed disposal site (*Aerojet, 1983*, Exhibit 1, page 345).

- Notification of Los Angeles County officials who subsequently visited the site. With their concurrence, the contaminated soil was excavated. The inlet pipe and all piping outside of the building were removed, replaced, and covered with clean fill (*Aerojet, 1983*, Exhibit 1 summary, page 345).

- Removal of approximately 20 cubic yards of sand, gravel, and cast iron pipe contaminated with TCE, tin, lead, and arsenic which were disposed at an offsite Class I landfill. (*Aerojet, 1983*, page 31, Exhibit 1, pages 341-354; Exhibit 1 summary). The approximate limits of the excavation trench were about 2 to 3 feet wide, approximately 100 feet long, and with a variable depth (*Aerojet, 1988*, page 114).

In 1984, with the knowledge of EPA, the tank was taken out of service. All materials were pumped out and disposed at an offsite Class I landfill. The plastic liner was removed and the concrete tank was filled with sand (*Aerojet, 1988*, Question 10, Attachment A, page 2).

In February 1985, the concrete tank was removed (*Aerojet, 1988*, page 99). On February 24, 1985, two soil samples were collected for Aerojet by BCL Associates, Inc.; at depths of 2 feet (Sample BC/10) and 4 feet (Sample (BC/12) below the tank as requested by the Los Angeles County Department of Public Works. Sample BC/10 consisted of sand, gravel and large rocks, with approximately a 15 percent moisture content. Sample BC/12 consisted of similar lithology with about 2 percent moisture content. Both samples were stored in clean (laboratory-certified) 8-ounce jars with Teflon-lined lids and delivered under chain of custody to ARLI (*Aerojet, 1988*, Question 8, Attachment A, pages 8-12).

The samples were analyzed for methanol, acetone, and TCE by gas chromatography, bromide by turbidometry, and lead, tin, and tellurium by atomic absorption spectroscopy. Methanol, acetone, TCE, bromide, tin and tellurium were not detected in either sample. The detection limits of the above parameters were 0.02 mg/kg, 0.001 mg/kg, 0.01 mg/kg, 1 mg/kg, 10 mg/kg and 0.2 mg/kg, respectively. Lead was detected in both samples at concentrations of 52 mg/kg and 6 mg/kg, respectively (*Aerojet, 1988*, Question 8, Attachment A, pages 6, 7).

1.1.4.2.2 Drainage Ditch South of Buildings 180, 187, and 156

During removal and cleanup of equipment from Buildings 180, 187, and 156 (Plate 4), in May 1971, mercury was observed by employees in the area where the equipment was being removed. Once the mercury was discovered, the equipment removal operation was stopped. Samples of surface water drainage south of Buildings 180, 187, and 156 were submitted to ARLI on May 19, 1971, for analysis of mercury, and a sample of the "West Pond" water (probably within the drainage course in the proving grounds area [see Section 1.1.6 and Appendix B]) was submitted for analysis of mercury, total dissolved solids, chloride, chloride + sulfate, nitrate, chromium VI, boron, and fluoride. The area was cleaned up and additional samples were collected after cleanup of the surface water (*Aerojet, 1988*, page 99; *Aerojet, 1983*, Exhibit 1, pages 337-338; *Aerojet, 1988* , Question 8, Attachment B, pages 1,2). The analytical results for samples collected before cleanup (*Aerojet, 1988*, Question 8, Attachment B page 1, laboratory log 51011) are presented in Table 2.

Five samples of Aerojet ElectroSystems Company plant water collected after the cleanup and submitted to ARLI on May 24, 1971, contained 0.003, 0.012, 0.014, 0.018, and 0.003 ppm mercury (*Aerojet, 1988*, Question 8, Attachment B page 2, laboratory log 51016).

No other records of soil, groundwater, or air testing undertaken in response to this release have been identified (*Aerojet, 1988*, page 100).

1.1.4.2.3 <u>The Abandoned Leach Bed Near Building 16 (Leach Pit LP-1)</u>

A 15-foot-square leach pit (LP-1 [Plate 4]) that was approximately 30 feet west of Building 16 was used for disposal of sanitary waste from Buildings 16 and 82. A detailed discussion regarding this leach pit is presented in Appendix B. In September 1983, a soil sample was collected from the abandoned leach pit (*Aerojet, 1983*, Exhibit 1, page 355B) and submitted to ARLI for TCE analysis. No TCE was detected at a detection limit of 10 ppb (*Aerojet, 1983*, Exhibit 1, page 355A).

1.1.4.2.4 <u>Building 322 Gasoline and Motor Oil Storage Tanks T-5 Through T-7</u>

In response to a directive issued by the Los Angeles County Department of Public Works (LACDPW), a leak detection/tank monitoring program (LDP/TMP) was instituted by Aerojet for underground storage tanks at the Azusa facility. A 10,000 gallon underground gasoline tank north of Building 322 (Tank T-5, see Appendix B) was investigated for Aerojet by Gregg and Associates, Inc. A Horner Ezy-Check tank integrity test (Horner test) was performed on Tank T-5 in 1985 and results from this test indicated that the tank was considered to be tight according to National Fire Protection Agency guidelines (*Aerojet, 1988* Question 10, Attachment E, page 8).

Further investigations were conducted in 1986 by Gregg and Associates to more accurately determine if the gasoline tank had leaked and to install permanent monitoring facilities. Two borings, AJ-1 and AJ-2, were drilled using a hollow-stem auger to depths of 15 feet. Because of the abundance of boulders and cobbles underlying the site, slant borings drilled to 40-foot depths (normally called for by county regulations) were not feasible. During drilling, soil texture, color, and moisture were recorded in the field by a geologist. Boring logs from this investigation are presented in *Aerojet, 1988*, Question 10, Attachment E, pages 36-38.

Two samples from each boring were collected in 6-inch-long sample tubes using a modified California sampler, at depths of 7 and 15 feet from Boring AJ-1 and 7.5 and 15 feet from Boring AJ-2. Sample tubes were capped with aluminum foil, overcapped with plastic end caps (secured with duct tape), labeled, and placed in an ice chest until refrigerated. The samples were submitted for analysis under chain of custody protocol to Analytical Technologies, Inc. (ATI), for analysis (*Aerojet, 1988*, Question 10, Attachment E, pages 1-58).

The four samples were analyzed for aromatic hydrocarbons by EPA Test Method 8020 and for total fuel petroleum hydrocarbons (TFPH) as gasoline by EPA Test Method 8015. The analytical results are presented in Table 3.

In addition to these subsurface investigations, two permanent 2-inch diameter PVC vapor monitoring wells were installed in Borings AJ-1 and AJ-2 and equipped with a continuous vapor detection system. An overfill protection box was also installed on the tank (*Aerojet, 1988*, Question 10, Attachment E, pages 1-58; Attachment F, page 1).

At the same time, a 280-gallon waste motor oil storage tank, Tank T-6, and a 550-gallon motor oil storage tank, Tank T-7, were taken out of service and removed (*Aerojet, 1988*, page 104; Question, 10 Attachment A, pages 1,2; Attachment B, pages 1 and 2). Both tanks were located north of Building 322 (Plate 4). Each excavation was approximately 6 feet wide, 8 feet long and 7 feet deep. No contaminated soil was identified (*Aerojet, 1988* response, page 115). Clean backfill (imported sand) was used to fill the two excavations.

1.1.4.2.5 <u>The Proving Grounds, Leach Beds, and Related Drainage Ditches</u>

Surface water samples were collected and analyzed on several occasions over the lifetime of the Proving Grounds, the leach beds, and the drainage ditches that led to the leach beds. The results of these investigations are described herein:

Wastewater in the drainage ditch below Building 152 was analyzed for aniline by Aerojet's own "H acid colorimetric method" and for pH by a "Beckman Type-G" pH meter (*Aerojet, 1983*, Exhibit 1, pages 28 and 58). In eleven samples collected over a period from December 16, 1948, to January 3, 1949, aniline concentrations ranged from below 1 ppm to 100 ppm, averaging between 10 and 20 ppm. pH ranged from 2.0 to 6.7, apparently depending on whether the sample was taken soon after nitric acid discharge or at some time between discharges (*Aerojet, 1983*, Exhibit 1, pages 28 and 58). An effluent sample was also collected by the County Engineer and analyzed by the County. The county sample contained 6.0 ppm chloride and 215 ppm nitrate, and had a pH of 4.22 (*Aerojet, 1983*, Exhibit 1, page 59). This work was described in:

- January 14, 1949, Aerojet Letter Report; Analysis for Acid and Aniline in Aerojet Drainage Ditches (*Aerojet, 1983*, Exhibit 1, page 28) and Department of County Engineer, Industrial Waste Division Inspection Report dated January 21, 1949 (*Aerojet, 1983*, Exhibit 1, page 58).

Aerojet conducted a study to determine whether aniline and fuming nitric acid would neutralize themselves on aging within practical time limits. Seven samples with varying acid/aniline ratios likely to be encountered during testing at the Proving Grounds were aged in the laboratory. The results showed that aging did not significantly reduce aniline or acid concentrations after aging periods of up to 16 days (*Aerojet, 1983*, Exhibit 1, pages 77-81).

Twelve samples of wastewater were also obtained from the Proving Grounds and analyzed during the period from August 4 through September 15, 1949. Aniline concentrations in these samples ranged from below detection limits to 100 ppm and the pH ranged from 0.8 to 7.8.

On October 7, 1949, an effluent sample taken from the central collection point in the Proving Grounds was analyzed by the Department of the County Engineer. The sample contained 71 ppm chloride, 25 ppm sulfates, 664 ppm nitrate, and had a pH of 2.6 (*Aerojet, 1983*, Exhibit 1, page 76).

M.C. Gill of Aerojet made recommendations for treatment of Proving Grounds wastewater prior to discharge into the industrial sewer on Irwindale Avenue (i.e. acid neutralization, settling, chlorination, and monitoring prior to discharge). Included with his recommendations was a summary of drainage water analyses from the Proving Grounds samples taken between November 1949 and February 1950. Samples collected after December 9, 1949, were composites of hourly sampling, taken upstream of the sump. In these samples, pH ranged from 1.7 to 6.2, aniline concentrations from 5 to 100 ppm, 5-day BOD from 4.6 to 20.1, and chlorine demand from 2.5 to 400 ppm. Following chlorination, aniline concentrations ranged from 0 to 10 ppm, and 5-day BOD from 2.7 to 17.3, and chlorine demand was 0 ppm. After neutralization, the 5-day BOD was 12 ppm and settling was complete in 2 hours (*Aerojet, 1983*, Exhibit 1, page 103). In addition, the results for spot samples of Proving Grounds drainage water collected from December 1948 through October 1949 were reported. Aniline concentrations ranged from below detection limits to 100 ppm, and pH values ranged from 0.8 to 7.8 (*Aerojet, 1983*, Exhibit 1, page 104). This work was described in:

- March 3, 1950, Aerojet Letter; Study of Waste Wash Water from Proving Grounds (*Aerojet, 1983*, Exhibit 1 pages 102-104).

1.1.4.2.6 "Leach Bed Pond B" (Leach Bed LB-2)

Effluent "Leach Bed Pond B" (Leach Bed LB-2, see Appendix B) and the drainage ditches leading to the leach bed were routinely sampled by the Los Angeles County, Department of County Engineer, Industrial Waste Division, during the period from December 2, 1960, through January 18, 1967 (*Aerojet, 1983*, Exhibit 3, pages 6-41). Effluent samples were analyzed for calcium, magnesium, sodium, iron, manganese, aluminum, boron, chromium, silica, hydroxide, carbonate, bicarbonate, chloride, sulfate, nitrate, sulfide, fluoride, phosphate, cyanide, pH, hardness (as CaCO3), alkalinity (as CaCO3), carbon dioxide, noncarbonate hardness, conductance, turbidity, and sodium ratio. Table 4 summarizes the results of these wastewater analyses.

1.1.4.2.7 Industrial Sewer System

During the period from April 1952 through January 1955 monthly reports summarizing the quantity, average pH and pH range, and total hours of effluent discharge were submitted by Aerojet to the Los Angeles County Sanitation District (*Aerojet, 1983*, Exhibit 1, pages 356-392). Table 5 summarizes the results of these reports. During the period August 8, 1952, through November 15, 1965, Los Angeles County also made inspections of the industrial waste system and reported observations of pH, discharge, and equipment inspections (*Aerojet, 1983*, Exhibit 1, pages 393-425).

1.1.4.2.8 Sewer System

At the direction of the Los Angeles County Sanitation District, data on the quality and quantity of sewage leaving the Aerojet property were collected from the

Hollyvale Street connection east of the property and at the 3rd Street connection (*Aerojet, 1983*, Exhibit 2 summary and *Aerojet, 1983* pages 34, 35). Samples of the sewer wastewater were routinely collected and analyzed for chemical oxygen demand, suspended solids, pH, total dissolved solids, ammonia, sulfide, cyanide, fluoride, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, zinc, oil and grease, chlorinated hydrocarbons, temperature, total flow, and peak flow. The results of these analyses for the period from May 2, 1973, to September 8, 1983, are presented in *Aerojet, 1983*, Exhibit 2, pages 165-435. Additional data for the period from September 8, 1983, through June 1988 are presented in *Aerojet, 1988*, Question 11, Attachment A.

In late 1983, samples of the incoming domestic water supply and wastewater from the 3rd Street sewer were collected and analyzed for VOCs. Samples were taken on October 4, 6, and 12, 1983, and analyzed by ARLI for dichloromethane, trichloromethane, 1,1,1-trichloroethane, trichloroethene, and toluene using EPA Test Method 624. Each sample analyzed was a composite of portions sampled at 0800, 1200, 1700, and 2000 hours. With the exception of 1,1,1-trichloroethane, no VOCs were detected (at a detection limit of approximately 0.5 ppb) in any of the drinking water or wastewater samples; 1,1,1-trichloroethane was detected in the three wastewater samples at concentrations of 6, 20, and 32 ppb.

1.1.4.2.9 PCB-Containing Transformers

In 1982, all eight PCB-containing transformers at the Aerojet facility were drained and flushed. Seven of these transformers were refilled with Dow Corning 561 silicone-base transformer fluid. The eighth transformer was disposed in an offsite

Class I landfill. The drained PCB oils were sent to an approved offsite disposal site for incineration (*Aerojet, 1983*, Exhibit 4, pages 64-66).

1.1.4.2.10 <u>Building 200, Tank T-2</u>

In June 1982, Tank T-2, a 1,000-gallon holding tank used to collect rinse water containing organic solvents, was removed at Building 200. No soil or sediments were removed from the site and the limits of the excavation are unknown. The tank contents were removed and analyzed prior to excavation. ARLI sampled the tank on June 4, 1982. Separate samples of water were collected at 2, 3, 4, 5, 6, and 6.5 feet from the top of the tank. About 4.5 feet of liquid was in the tank. A light layer of solid sludge was on the bottom of the tank and consisted of "dirt" and partially decomposed leaves and humus. Gas chromatographic analysis at each depth showed no chlorinated solvents and only low levels of other solvents. The average concentrations of solvents from all depths were: methanol, 2 ppm; ethyl acetate, 3 ppm; butyl acetate, 3 ppm; methylisobutyl ketone, 2 ppm; and xylenes, 20 ppm. In addition, qualitative tests for the presence of heavy metals and cyanides detected none of these compounds. The pH of the sampled water from the tank was 7.3 (*Aerojet, 1988*, Question 11, Attachment B, pages 1,2). Clean backfill was used to fill the excavation and no contaminated soil was identified (*Aerojet, 1988* pages 106, 116).

1.1.4.2.11 <u>Building 57 Effluent</u>

In November 1952, effluent water being discharged from the Building 57 plating line was sampled and analyzed prior to discharge to the industrial waste line (*Aerojet, 1988* page 107). The sample was analyzed by Smith-Emery Company and contained no detectable dissolved sulfides, suspended solids, metallic particles, cyanide, phenols, emulsified oil and grease, or ether-soluble matter. Total solids in the sample were 1,128.0 ppm; settleable solids, 2 milliliters per liter; chromium, 282.2 ppm; boron, 0.4 ppm; and pH, 3.5 (*Aerojet, 1983*, Exhibit 1, page 231).

1.1.4.2.12 Building 164, Oil Skimmer Sludge Pit

On May 23, 1983, a sample of sludge from the bottom of the Building 164 Oil Skimmer Sludge Pit was collected in a plastic container. The sample was analyzed by ARLI for heavy metals according to ARLI Method 600-102, which consists of leaching the sample and analyzing the metals by atomic absorption spectroscopy. The sample contained arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver at concentrations of 0.053 milligrams per liter (mg/l), 27.5 mg/l, 0.15 mg/l, 0.08 mg/l, 0.25 mg/l, 0.09 mg/l, 0.075 mg/l and 0.1 mg/l, respectively (*Aerojet, 1983*, Exhibit 2, page 436, 1988 response, page 106).

1.1.4.2.13 JPC Sump

The JPC sump was located outside Building 163 (Plate 4) and had a holding capacity of approximately 1,200 gallons. The sump was installed for JPC operations in approximately 1979, during the period when Building 163 was leased to JPC for use as a pump and valve refurbishing facility. In 1989, when JPC vacated the property, Aerojet abandoned the sump by filling it with sand and placing an asphaltic concrete cap over the cover. In July 1991, the sump was removed for closure in accordance with a permit from and under the supervision of the Los Angeles County Department of Public Works. During removal, the sump was found to be constructed of reinforced concrete, to be in good condition, and to have a small amount of liquid at the bottom of the sump indicating that the sump bottom was still watertight. A single inlet pipe ran from an outside drain grate into the south end of the JPC sump.

Soil samples for laboratory chemical analysis were collected from: the sand backfill in the sump bottom, soil 4 feet beneath the inlet pipe, native soil 2 feet beneath the bottom of the sump and soil from the excavation. The samples were transpoted under chain of custody and delivered to Thermo Analytical, Inc., a California state certified laboratory, for chemical analysis. All soil samples were submitted for analysis of total recoverable petroleum hydrocarbons using EPA Test Method 418.1, total petroleum hydrocarbons using modified EPA Test Method 8015, volatile organics using EPA Test method 8240, and selected priority pollutant metals including copper, mercury, zinc, arsenic, nickel, barium, lead, cadmium, chromium, and selenium. Aerojet anticipates receipt of the analytical data for these samples in September 1991.

1.1.5 Aerial Photograph Review

Forty-eight black and white halftone AISA aerial photographic prints (provided by EPA with acetate overlays) were reviewed, along with glossy duplicate prints obtained by Aerojet for 40 of the 48 prints, for potential source area identification, characterization, and description development. The photographs were taken from 1945 to 1988. A list of the historical aerial photographs reviewed is provided in Table 6. The eight aerial photographs for which no glossy prints were available were EPA Prints 4, 14, 20, 28, 34, 35, 36, and 40. Of these eight, all but No. 40 were supplied to EPA by Optical Radiation Corporation; No. 40 was supplied by Transit Mixed Concrete Corporation.

Each photograph was reviewed using an eight-times magnification to identify and/or verify key features of interest. The results of the aerial photograph study were used, together with historical environmental documentation, in the development of potential source area descriptions and to locate the AISA features on plan view drawings.

Table 7 provides a cross-reference summary of potential source areas and regulatory areas of interest and the photograph(s) (using the EPA identification numbering system) on which they are visible. Within the context of this work plan, the term potential source area is used to designate locations within the boundary of the AISA for which the available information on that location justifies environmental sampling. Descriptions of potential source areas and other areas of regulatory concern are provided below in Section 1.1.6 and in Appendix B.

1.1.6 Identification of Potential Source Areas Within the AISA

To develop this section (and additional information provided in Appendix B), HLA studied historical AISA information including 48 aerial photographs (described in Section 1.1.5), Aerojet's 1983 and 1988 3007/104(e) response documents, and those portions of 3007/104(e) response documents from other PRPs within the AISA that were made available by EPA. On the basis of this study, the following section provides a description of: 1) potential source areas identified within the AISA, 2) areas of interest identified in the *SOW* for which no source information was available, and 3) areas that have been identified as potential chemical handling areas, but on the basis of age, construction, use, or material handling documentation are not confirmed as potential source areas. The studied areas are shown on Plate 4; potential source areas are distinguished on Plate 4 with a stippled pattern.

On the basis of the historical information, the potential source areas, areas of interest identified in the *SOW*, and potential chemical handling areas that are not confirmed as potential source areas can be organized into the following 16 categories: Degreasers, Drum Storage Areas, Sumps, Storage Tanks, Waste Disposal Areas, Burn Area, Ring Channels, Stain and Liquid Areas, Industrial Waste Treatment Systems, Ponded Liquid Areas, Leach Beds, Leach Pits, Drainage Courses, PCB Transformers, the E.K. Metzner Area Automobile Wrecking Yard, and the E.K. Metzner Go-Cart Raceway.

1.1.6.1 Degreasers

A total of 17 degreaser locations have been identified within the boundary of the AISA, based on the review of Aerojet 3007/104(e) response documentation. These locations have been designated DE-1 through DE-17, and degreaser location DE-1 has been further subdivided into two separate locations designated as DE-1a and DE-1b. Available information on each of these degreasers is presented in Appendix B. The degreaser locations are listed on Table 8 and shown on Plate 4.

During the period from 1943 to 1971, the Azusa facility had a total of eight vapor degreasers in use at various times, all of which used TCE, with the exception of one which used PCE (*Aerojet, 1988*, 104(e), Exhibit 5). Degreasers were supplied with fresh solvent from 55-gallon drums. Historical documentation indicates that carbon tetrachloride was used at unspecified locations at the facility for cold cleaning (hand wiping) of solid propellent equipment and rocket motors between 1947 and 1953. TCE has been used instead of carbon tetrachloride for cold cleaning since 1953. Prior to 1953, spent degreasing solvents were pumped from the degreasers into 55-gallon drums. Spent solvents were then sold to an offsite reclaimer. In 1953, a program was started to send the used solvent to a reclaimer and to return the processed solvent to Aerojet for use.

In 1967/68, Los Angeles County Air Pollution Control District Rule 66 eliminated the practical use of TCE in degreasers, and Aerojet's remaining TCE (and PCE) degreasers were converted to use 1,1,1-TCA or were removed from service.

Waste solvents and lubricants were sent to Oil and Solvent Process Company, Azusa, California, until 1976. After that date, waste solvents and other wastes were transported to an offsite Class I landfill (*Aerojet, 1983*, 104(e), page 33).

In 1971, the last of the original 8 degreasers was removed. Smaller vapor degreasers began to appear in air quality permit records at the Aerojet facility in 1976 (Aerojet, 1983, 104(e), Exhibit 5). No documentation is available regarding degreasers at the Aerojet facility from 1971 to 1976. As of 1988, Aerojet had 7 small vapor degreasers in operation, 6 of which used Lonco 113 (a mixture of 1,1,1-TCA, trichlorotrifluoroethane [Freon 113, Freon TF], and isopropyl alcohol), and one of which used 1,1,1-TCA. Two additional small degreasers installed in 1976 (which used Freon TF and Lonco 113 respectively) were placed in storage in 1983. The size and current status of Aerojet degreasers is summarized in Table 8a (*Aerojet, 1983*, 104(e), Exhibit 5). As summarized in Appendix B, specifications of the 17 degreasers indicate that seven used TCE (one of which was relocated from Building 57 to 136), one used PCE, and the remainder (more recent) degreasers use or used either Lonco 113 or 1,1,1-TCA. On the basis of the individual size of the degreasers and on historical information, it is known that two degreasers were installed, in part, below grade (DE-1a and 1b, and DE-6). The remaining degreasers were smaller above-grade units installed in buildings above concrete slab floors, except for DE-4, which was located under a shed-type roof, on an unknown type of floor construction.

As indicated above, waste solvents from degreasers were pumped into 55-gallon drums for offsite disposal and/or recycling, and fresh solvent was introduced from new 55-gallon drums. No degreaser spills have been recorded in available documentation. Because the degreasers were inside buildings (except DE-4) and within personnel working areas, any accidental release of fresh or waste solvent from above grade degreasers would have been quickly noticed, reported, and cleaned up to remove the resulting health and safety hazard.

Based on these considerations, three degreasers and four degreaser locations, DE-1a, DE-1b, DE-6, and DE-4 are identified as potential source areas. Because the only chemicals used in these degreasers were halogenated solvents and alcohol, soil samples collected from these areas will be analyzed primarily for halogenated organic compounds, and at the request of the EPA/RWQCB, at least one soil sample from each location will be tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*, as described in Section 2.4.1.1.1. In addition, those areas of the AISA where the 17 identified degreasers have been located will be investigated, where access permits, during the Soil Gas Characterization Program as described in Section 2.2.

1.1.6.2 Drum Storage Areas

A total of 27 drum storage areas have been identified by either EPA or Aerojet within the boundary of the AISA, based on review of aerial photographs and 3007/104(e) response documentation. These drum storage areas have been designated DR-1 through DR-27, and drum storage area DR-25 is further subdivided into four separate locations designated as DR-25a through DR-25d. Available information on each of these drum storage areas is presented in Appendix B. The drum storage areas are listed in Table 8 and are located as shown on Plate 4.

Bulk chemical storage within the AISA has always been limited to a few aboveground and belowground tanks (see Section 1.1.6.4). Therefore, it appears that essentially all chemicals delivered in quantities greater than a few pounds or gallons were handled in drums. Solvent wastes and plating wastes from Building 57 were also collected and temporarily stored, pending disposal, in drums. As a result, the contents of drums stored in the AISA are likely to have represented a wide range of chemicals associated with historical activities in the AISA, including volatile and semivolatile organics, chlorate, cyanide, and metals. However, the potential that detectable quantities of some of these chemicals could have been released to soils from some or all drum storage areas is very limited, as discussed below.

The volatile and semivolatile organics that would have been stored in drums include halogenated and aromatic solvents used in cleaning and degreasing, and organic constituents of rocket fuels and their waste products. However, semivolatile organics generally have much lower environmental mobility than volatile organics and would not be transported as far from any release points as volatile organics.

Chlorates would be potential drum contents in areas where solid rocket fuels and their components were stored, handled, or tested. However, these chemicals are solid oxidizers that would have been quickly and readily cleaned up, if released as pure product, because of their ignition hazard potential and dry powder form. As constituents of solid rocket fuel and fuel wastes, they would have been destroyed in test firings or waste burning rather than released to the environment. Therefore, the likelihood that chlorates would be present in significant quantities in drum storage areas appears to be low, however, at least one soil sample from each soil boring proposed in the drum storage areas will be analyzed for chlorates.

Cyanide was apparently used at the Aerojet facility for small scale precious metals plating operations that were very unlikely to have required drum quantities of cyanide. Furthermore, available documentation indicates that the waste streams from these operations were carefully managed and treated to recover excess precious metals.

Finally, industry experience indicates that cyanide is seldom detected at significant concentrations even in actual plating area soils except when the plated metals are also detected at very high concentrations, apparently due to the naturally short persistence time of cyanide in the environment. Therefore, the likelihood that cyanide would be present in significant quantities in drum storage areas appears to be low; however, at the request of the EPA/RWQCB, at least one soil sample from each soil boring proposed in the drum storage areas will be analyzed for cyanide.

Metals would not have been delivered to the site in drums, except possibly for aluminum powders used in solid rocket fuels. No aluminum powder spills have been recorded in available documentation. Any significant aluminum powder spills would have been quickly and readily cleaned up, because of their ignition hazard potential and dry powder form. When present as a constituent of solid rocket fuel and fuel wastes, aluminum would have been oxidized to inert aluminum oxides comparable to natural soil constituents during either test firings or waste burning. Therefore, the likelihood that aluminum would be present in drum storage areas at concentrations or in forms significant when compared to natural soils appears to be low; however, at the request of the EPA/RWQCB, at least one soil sample from each soil boring proposed in the drum storage areas will be analyzed for aluminum.

Other metal waste streams would largely have been either recycled solid scrap from metal fabrication facilities or waste plating fluids from operations in Buildings 53 and 57. Plating wastes from Building 53 were collected in Tank T-3, rather than drummed, but plating wastes from Building 57 were collected in drums, that appear likely to have been stored in drum storage area DR-1. Therefore, the likelihood that metals would have been released to the environment in significant quantities in drum storage areas other than DR-1 appears to be low; however, at the request of the EPA/RWQCB, at least one soil sample from each soil boring proposed in the drum storage areas will be analyzed for the full suite of metals as identified in Table 2-6 of the *SOW*.

In summary, drum storage areas as a group only appear to be credible potential sources of volatile and semivolatile organics, except for drum storage area DR-1, where plating wastes from Building 57 were apparently held in drums pending disposal. All drum storage areas will be incorporated into the Soil Gas Characterization Program as discussed in Section 2.2. In addition, at least one soil boring is proposed to be located at each of the following drum storage areas listed below where site specific information is available (as summarized in Appendix B), and also at 22 of the remaining drum storage areas where the history of chemical storage is less well defined. Specific analytical methods for all analyses of soil samples from drum storage areas are specified in Section 2.4.1.1.2. The drum storage areas where site specific information may warrant the location of a soil boring include:

- DR-8; this drum storage area is a concrete paved receiving area for virgin solvents, however, no documented spills or other chemical releases have been reported.

- DR-15; this area was identified by EPA as a drum storage area, based on EPA's review of aerial photographs. However, drums are not visible in the aerial photographic prints reviewed by Aerojet. Nevertheless, the aerial photographs do indicate that DR-15 is an area of miscellaneous outdoor storage.

- DR-24; this area was identified by EPA as a drum storage area, based on EPA's review of aerial photographs. However, drums are not visible in the aerial photographic prints reviewed by Aerojet. Nevertheless, the aerial photographs do indicate that DR-24 is an area of miscellaneous outdoor storage.

1.1.6.3 Sumps

Two sumps (the JPC sump and S-1) have been identified within the AISA boundary. As discussed in Section 1.1.4.2.13, the JPC sump is being investigated separately, under Los Angeles County sump closure regulations. Sump S-1, as identified in the *SOW*, is located at the Optical Radiation Corporation (ORC) facility along the south side of former Building 159 (Plate 4). Available information on sump S-1 is presented in Appendix B. The sump is also listed in Table 8. Sump S-1 was in use from 1972 to 1977. No additional information regarding this sump, which was installed and used by ORC, has been available. However, ORC responses to EPA 3007/104(e) information requests state that ORC used volatile and semivolatile organic chemicals and performed nickel, chrome, copper, and rhodium plating in the AISA. Therefore, soil samples from this area will be analyzed primarily for volatile and semivolatile organics, and at least one soil sample will be analyzed for cyanide and the full suite of metals as identified in Table 2-6 of the *SOW*. Sump S-1 will also be incorporated into the Soil Gas Characterization Program as described in Section 2.2.

1.1.6.4 Fuel, Oil, Solvent, And Waste Storage Tanks

A total of nine storage tanks at eight storage tank locations have been identified within the boundary of the AISA. Available information on each of these tanks, designated as T-1a and T-1b through T-8, is presented in Appendix B. The storage tanks are listed in Table 8 and are or were located as shown on Plate 4. Based on 3007/104(e) response documentation, including material storage and tank integrity testing data, Tanks 1a and 1b, and Tanks T-2 through T-5 have been identified as potential source areas, and Tanks T-6 through T-8 are not potential source areas. The basis for these determinations are detailed in Appendix B, which describes why Tanks T-6 through T-8 are believed not to have leaked.

Tank T-1a was used for heavy fuel oil storage. Available information indicates that Tank T-1b, nominally identified as a TCE tank, was never used. Therefore, soil samples from these locations will be tested primarily for halogenated and aromatic organics, and at the direction of the EPA/RWQCB, at least one soil sample from each boring will be analyzed for cyanide and the full suite of metals as identified in Table 2-6 of the *SOW*.

Tank T-2 was used for disposal of rinse water containing low concentrations of solvents. Previous testing of tank contents detected no heavy metals or cyanide. Therefore, soil samples from this area will be tested primarily for volatile and semivolatile organics, and at the direction of the EPA/RWQCB, at least one soil sample will be analyzed for cyanide and the full suite of metals as identified in Table 2-6 of the *SOW*.

Tank T-3 was used for disposal of organic and metal wastes from laboratory operations. Therefore, soil samples from this area will be tested primarily for volatile and semivolatile organics, and at least one soil sample will be analyzed for cyanide and the full suite of metals as identified in Table 2-6 of the *SOW*.

Tank T-4 was a gasoline storage tank. Therefore, soil samples from this area will be tested primarily for aromatic organics, and at the direction of the EPA/RWQCB, at least one soil sample will be analyzed for cyanide and the full suite of metals as identified in Table 2-6 of the *SOW*.

Tank T-5 was a gasoline storage tank that remained in service from 1971 through June 1991, when it was decommissioned under permit during a closure investigation supervised by the Los Angeles County Department of Public Works. Although closure for this tank was obtained, the EPA/RWQCB has requested that this area be further investigated. Therefore, soil samples from this area will be tested primarily for aromatic organics, and at least one soil sample will be analyzed for cyanide and the full suite of metals as identified in Table 2-6 of the *SOW*.

1.1.6.5 Waste Disposal Areas

Evidence of the waste disposal areas, as identified by the EPA in the *SOW*, is the EPA interpretation of historical aerial photographic prints. Four waste disposal areas (WD-1 through WD-4) were identified by the EPA within the boundaries of the AISA. On the basis of subsequent Aerojet review of aerial photographic prints and the Aerojet 3007/104(e) response documentation, only WD-1 has been confirmed as a potential source area. As described in Appendix B, waste disposal areas WD-2 through WD-4 have not been confirmed as potential source locations. Areas WD-1 through WD-4 are listed in Table 8 and are located as shown on Plate 4. Waste disposal area WD-1 may not have actually been used specifically for waste disposal, but was located in a former rocket motor testing area. Therefore, soil samples from this area will be analyzed for chemicals associated with rocket motor testing; specifically, semivolatile organics, chlorate, and dioxins/furans. In addition, at least one soil sample from each location will be analyzed for cyanide and the full suite of metals as identified in Table 2-6 of the SOW.

1.1.6.6 Burn Area

Burn area BA-1 has been identified at the northwestern corner of the AISA. Available information on BA-1 is presented in Appendix B. BA-1 is listed in Table 8 and is located as shown on Plate 4.

As summarized in Appendix B, BA-1 was used to dispose of waste solid rocket propellant by controlled burning. This burning was performed under permit from the

Los Angeles County Air Pollution Control District, and was restricted to 1,200 pounds per day. Solid propellant used at the facility was composed of asphalt or fuel oil and perchlorate oxidizers. In addition, it was reported that the Dameral-Allison Company was using the area around BA-1 to dispose of juicing-plant citrus peels and other citrus wastes (*Aerojet, 1983*, 104(e), Exhibit 7). On the basis of the composition of the solid propellant burned in BA-1, soil samples collected from BA-1 will be analyzed for semivolatile and volatile organics, dioxins/furans, and chlorate. In addition, at the direction of the EPA/RWQCB, at least one soil sample from each boring will be analyzed for cyanide and the full suite of metals as identified in Table 2-6 of the *SOW*. No releases of chemicals of regulatory concern would be expected from citrus wastes.

1.1.6.7 Ring Channels

Two concrete ring channels have been used on the Aerojet facility. Both were located in the eastern portion of the Aerojet facility (Plate 4). The smaller (RC-1a) and larger (RC-1b) ring channels were observed on Prints 27 and 31, respectively, of the 48 Aerial photographs reviewed (Table 7). The outside diameters of the channels RC-1a and RC-1b were approximately 55 and 120 feet and the inside diameters were 40 and 70 feet, respectively. The space between the outer and inner rings was filled with water. These concrete towing tanks were used to test the hydrodynamic efficiencies of various hull designs and for other underwater mechanical engineering testing (*Aerojet, 1983*, 104(e), Exhibit 1, page 25). Only physical tests were performed inside the ring channels; no chemical testing occurred within these structures.

The smaller, western ring channel (RC-1a) was installed before 1945. Aerial photographs indicate that this ring channel was demolished and removed between February 1966 and September 24, 1968. The larger, eastern ring channel (RC-1b) was constructed in approximately 1947 and demolished and/or removed between March 1971 and October 24, 1975. Because no chemicals were used, stored, or disposed in either ring channel, neither location is a potential source area; however, at the direction of the EPA/RWQCB, the ring channel locations will be incorporated into the Soil Gas Characterization Program as described in Section 2.2.

1.1.6.8 Stain and Liquid Areas

Six stain and liquid areas, designed SL-1 through SL-6, have been identified by EPA within the boundaries of the AISA on the basis of interpretation of historical aerial photographs. Available information on each of these stained and liquid areas is presented in Appendix B. The stain and liquid areas are listed in Table 8 and are located as shown on Plate 4.

On the basis of information summarized in Appendix B, site by site considerations regarding chemical analyses in those areas to be assessed can be summarized, as follows:

- SL-1; this stain and liquid area was located within the southern portion of the Proving Grounds. The primary buildings in the Proving Grounds were liquid and solid propellant test bays, fuel and material storage buildings, machine shops and laboratories, and associated offices and other facilities (Aerojet, 1988, 104(e) response, page 21). The primary function in this area was to test rocket motors. On the basis of these activities, and of documentation regarding previous investigations and analyses, soil samples collected from borings in SL-1 will be analyzed primarily for volatile and semivolatile organics, dioxins, chlorate, and at least one soil sample from each boring will be analyzed for cyanide and the full suite of metals as identified in Table 2-6 of the *SOW*.

- SL-2; this stain and liquid area was located in the northern portion of the AISA and received water from the roof drains originating from swamp coolers and soaker hoses for cooling Building 119. The source of this water was swamp coolers and soaker hoses that were used to cool the building. There is no documentation indicating any chemical release in this area, however, at the direction of the EPA/RWQCB, the area of SL-2 will be incorporated into the Soil Gas Characterization Program.

- SL-3; this stain and liquid area was located in the central portion of the AISA and received water from the roof drains at Building 116. There is no available documentation relating to any chemical release in this area, however, at the direction of the EPA/RWQCB, the area of SL-3 will be incorporated into the Soil Gas Characterization Program.

- SL-4; this stain and liquid area is subdivided into three distinct locations (SL-4a, b, and c), and is believed on the basis of Aerojet employee statements to represent areas where material associated with fertilizer/agricultural product processing (grape and citrus wastes) was stockpiled on the E.K. Metzner property. No historic documentation was available for the E.K. Metzner property. However, on the basis of the type of product believed to have been produced at this facility, there would not have been releases of chemicals of regulatory concern resulting from these areas. Therefore, no soil sampling is proposed in this area. However, SL-4 is within the western limited data area where a nominal 100-foot grid soil gas study will be conducted.

- SL-5; this stain and liquid area was located in the far western portion of the AISA, and consisted of a small drainage originating at Building 189. When in use by Aerojet, Building 189 was used as a glass bead melting laboratory. In 1976, this and surrounding property was leased (and later purchased in 1979) by Reichhold Chemical, Inc. On the basis of the types of organic chemical wastes produced at the Reichhold facility, and the proximity of SL-5 to an area designated as a Reichhold facility drum storage area, soil samples collected from SL-5 will be analyzed primarily for volatile and semivolatile organics, and at least one soil sample will be analyzed for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*.

- SL-6; this stain and liquid area was located in the west central portion of the AISA, and consisted of an area of ponded liquid originating from ORC (Building 159). ORC 3007/104(e) response documentation indicates that ORC uses volatile and semivolatile organics, as well as nickel, copper, chromium, and rhodium. On the basis of this information, soil samples collected at SL-5 will be analyzed for volatile and semivolatile organics, cyanide, and the full suite of metals identified in Table 2-6 of the *SOW*.

1.1.6.9 Industrial Waste Treatment Systems

Industrial waste treatment systems WT-1 and WT-2 were operated from April 5, 1952, to 1971 and from 1971 to the present, respectively. Detailed descriptions of these systems are presented in Appendix B. The systems are listed in Table 8 and are located as shown on Plate 4.

System WT-1 received wastewater from rocket test bays, chemical laboratories, manufacturing and plating facilities, and plastics operations. System WT-2 only receives rinse waters and Aerojet policy prohibits chemical disposal to drains. However, the exact nature of wastes actually received by each of the systems for treatment is not clear. Therefore, soil samples from these two areas will be analyzed for volatile and semivolatile organics, chlorate, and at least one soil sample from each boring will be analyzed for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*.

1.1.6.10 Ponded Liquid Areas

Evidence for areas that might have contained ponded liquids, as identified by the EPA in the 1991 *SOW*, was drawn from EPA interpretations of historical aerial photographs. Five ponded liquid areas (PL-1 through PL-5) have been identified by the EPA within the boundaries of the AISA. Available information on ponded liquid areas is presented in Appendix B. These areas are listed in Table 8 and are located as shown on Plate 4. Based on the review of aerial photographic prints and the Aerojet 3007/104 (e) response documentation, areas PL-3 and PL-4 have been eliminated from being areas of concern. Ponded liquid area PL-1 is located near the ring channel RC-1a area, immediately adjacent to Building 65. No specific information about the chemical contents of PL-1 is available, but it likely received drainage from the machine shop in Building 65 and/or RC-1a. On the basis of possible drainage from Building 65 into PL-1, soil samples from this area will be tested primarily for volatile organics, and at least one soil sample will be analyzed for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*.

Ponded liquid area PL-2 is located west of the Special West Area and immediately south of Buildings 301 and 317, which were testing and laboratory facilities, and which contributed drainage to PL-2. Soil samples from this area will be tested for volatile and semivolatile organics, chlorate, and at least one soil sample will be tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*.

Ponded liquid area PL-5 is located in the southwestern portion of the Aerojet facility. It consists of two distinct areas immediately south and west of Building 310, and east of the former waste treatment facility WT-1. Facilities in this area were used for storage of fuels and chemicals, waste treatment, and rocket motor testing. Soil samples from this area will be tested for volatile and semivolatile organics, chlorate, dioxins/furans, and at least one soil sample will be tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*.

1.1.6.11 Leach Beds

On the basis of review of aerial photographs and 3007/104(e) response documentation, four leach beds have been identified within the boundary of the AISA. These leach beds have been designated LB-1 through LB-4. Leach Bed LB-2 consists of two general locations immediately adjacent to one another. Detailed available information on each specific leach bed is presented in Appendix B. A summary of leach bed area information is given in Table 8 and the leach beds are located as shown on Plate 4.

Between 1943 and 1952, leach bed LB-2 was used to collect wastewater from rocket test firings, industrial waste effluents, cooling water from swamp coolers, water drainage from the ring channels, and surface water runoff from rainfall. During this time period leach bed LB-3 collected surface water runoff, cooling tower and boiler water, and ring channel drain water. After 1952, the wastewater associated with rocket test firings was collected in a drainage ditch downslope of the test area, diverted to and then treated at the onsite industrial waste treatment facility (IWTF [see Section 1.1.6]). After 1952, industrial waste effluent from the Aerojet facility operations was also diverted to and then treated at the IWTF. An industrial waste disposal permit was issued by the City of Irwindale and the County of Los Angeles to Aerojet in 1961 and established specific criteria for materials discharged to the active leach beds. To ensure compliance with these discharge criteria, a Los Angeles County Engineer regularly sampled the active leach beds (LB-1, LB-2, and LB-4). In 1970, two leach beds (LB-2 and LB-4) of the remaining three active leach beds were covered with clean soil and regraded. Currently, the only remaining active leach bed is the one south of the facility (LB-1), which is currently only used to collect and dispose of (via evaporation and percolation) rainwater runoff.

Historically, the leach beds have been used for the temporary storage, treatment (by evaporation), and disposal (by evaporation and percolation) of water from various operations at the Aerojet site. On the basis of information in Appendix B, rainfall runoff has been commonly drained to all leach beds. "Once-through" cooling water and some cooling tower water was also drained to the leach beds.

Leach Bed LB-1 is located immediately adjacent to the Proving Grounds area where liquid and solid propellant test bays, fuel and material storage buildings, machine shops and laboratories, and assorted offices and other facilities were present. The 1988 3007/104(e) response indicated a potential for Lexsol 408 (xylene, naphthalene, paraffins, alcohols, and acetates) being released to LB-1 during 1961 to 1962 (Aerojet, 1988, 104(e), Page 101). During storms, treated wastewater from the IWTF was drained to LB-2 when the permitted maximum allowable effluent discharge rate from WT-1 to the Irwindale industrial waste sewer was exceeded. Wastewater treated at WT-2 included wastes from rocket test bays, chemical laboratories, manufacturing and plating facilities, and plastics operations. Leach Beds LB-3 and LB-4 are located in areas of machine shops and solid propellant preparation, respectively. Although Aerojet's past and present policy prohibited the disposal of organic chemicals to drains, the exact composition of the water drained to all of the leach beds is not known.

On the basis of this information, soil samples collected in the Leach Bed areas LB-1 through LB-4 will be analyzed for volatile and semivolatile organics, and at least one soil sample from each location will be tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Leach Beds LB-1, LB-2, and LB-4 may have received wastewater associated with solid propellant testing. Thus, the soil samples collected from these areas will also be analyzed for chlorate.

1.1.6.12 Leach Pits

Seven leach pits (LP-1 through LP-7) have been identified within the boundaries of the AISA, on the basis of review of aerial photographs and 3007/104(e) response documentation. Detailed available information on each of these leach pits is presented in Appendix B. A summary of leach pit information is given in Table 8 and the leach pits are located as shown on Plate 4.

Leach Pits LP-1 and LP-2 were installed for sanitary disposal of domestic wastes and not for disposal of industrial and/or laboratory wastes. It was the policy of the facility, as documented in 1947 (*Aerojet 1983*, 104(e), Exhibit 1, Page 1) to separately collect organic wastes for subsequent disposal. Thus, industrial organic wastes should not have drained to LP-1 and LP-2 during their use. The wastewaters discharged to Leach Pits LP-1 and LP-2 contained acids, bases, water soluble salts, alkali metals, some inorganic reagents (excluding cyanides, chromium, and flourine), potassium perchlorate, and ammonia (Aerojet, 1983, 104(e), Exhibit 1, page 21). On the basis of the chemicals drained to LP-1 and LP-2 and the potential use of organics at the buildings (Buildings 16/82 and 40, respectively) draining to these leach pits, the soil samples collected at LP-1 and LP-2 will be analyzed for metals and chlorate, and at least one sample from each location will be tested for cyanide. Volatile and semivolatile organics will also be analyzed in order to promote overall AISA-wide data coverage for these chemicals.

Leach pits LP-3 through LP-7 are associated with domestic wastes only. Domestic wastewater from the buildings associated with Leach Pits LP-3 through LP-7 were drained to the septic tank and leach field/leach pit system. The buildings associated with Leach Pits LP-3 through LP-7 were all constructed prior to 1957. No sewer services were provided to the buildings within the AISA prior to 1957 and all domestic wastewater was drained to septic tank and leach field/leach pit systems. By 1957, the City of Azusa's domestic sewer system was connected to buildings throughout the majority of the AISA facility (Aerojet 1983, 104(e), Exhibit 2, Drawing 29). Following the connection of the City of Azusa's domestic sewer system, the previously used septic tanks and leach field/leach pits were pumped and filled with clean sand. Because LP-3 through LP-7 only drained domestic wastes, they are not believed to represent potential source areas; however, at the direction of the EPA/RWQCB, soil borings are proposed in areas LP-3, LP-6 and LP-7, and soil samples will be analyzed primarily for volatile and semivolatile organics. In addition, at least one soil sample from each boring will be tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*.

1.1.6.13 Drainage Courses

Three specific surface water drainage courses (designated DG-1 through DG-3) and one drainage basin (designated B-1) were identified within the boundary of the AISA, based on review of aerial photographic prints. These drainage courses, located at the southern edge of the AISA, controlled stormwater runoff, which in general flowed from north to south in the AISA. Available information on each of these drainage courses is presented in Appendix B. The drainage courses are listed in Table 8 and are located as shown on Plate 4.

On the basis of the information presented in Appendix B, the need for investigations at the identified drainage courses and drainage basin can be summarized as follows:

- DG-1/B-1; drainage course DG-1 controlled runoff from the central portion of the AISA, including the Proving Grounds. During periods of significant runoff, DG-1 channeled surface water into basin B-1. The primary buildings in the Proving Grounds were liquid and solid propellant test bays, fuel and material storage buildings, machine shops and laboratories, and associated offices. The function of these buildings was to test rocket motors. On the basis of these activities samples along the currently remaining portions of DG-1 should be analyzed primarily for volatile and semivolatile organics, dioxins/furans, chlorate, and at least one soil sample at each location will be tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Because approximately 170 feet of material has been removed beneath the original position of basin B-1 (see Appendix B) no sampling is currently proposed in this area. If, however, elevated concentrations of chemicals are detected along DG-1, soil samples will also be collected from B-1 and tested for the respective chemicals.

- DG-2; this drainage course was constructed between 1983 and 1985 in association with construction of ponded liquid area PL-4 (see Section 1.1.6.10.4). DG-2 receives only present-day stormwater runoff that collects as a result of sheet flow from the large asphalt-paved parking lot in the southeast corner of the AISA. There is no documentation indicating any chemical releases into this drainage (or into PL-4). Therefore, no soil or soil gas analysis is proposed in this area.

- DG-3; this drainage course was located at the southern edge of the western AISA. DG-3 channeled surface water runoff from a portion of the Day and Night property and a limited area of the westernmost Aerojet facility from prior to 1945 until 1948. During this period, the Day and Night facility produced and tested photo flash-bombs, and any residual chemicals that might be present in DG-3 sediment would likely be associated with these activities. Therefore, samples from DG-3 should be analyzed primarily for volatile and semivolatile organics, chlorate, and at least one soil sample from each location will be tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. It should be noted that the area where DG-3 was located has subsequently been regraded and buildings have been constructed. It is currently unknown if representative sediment sample collection is possible due to the surface modifications in this area.

1.1.6.14 PCB-Containing Transformers

In 1982, all eight transformers at the Aerojet Azusa facility containing polychlorinated biphenyls (PCBs) were drained and flushed, and seven were refilled with Dow Corning 561 silicone-based transformer fluid. The seven remaining transformers are designated TP-1 through TP-7 on Plate 4. One transformer was sent to an offsite Class I landfill for disposal by burial. The PCB waste (Askarel fluid) was sent to an approved offsite disposal site. As summarized in Appendix B, onsite filtering has been performed to further lower the residual PCB levels in the remaining transformers to below 50 ppm. Based on these data, sediment samples collected from locations TP-1 through TP-7 should be analyzed for PCBs.

1.1.6.15 E.K. Metzner Automobile Wrecking Yard

The former Metzner Property automobile wrecking yard (Plate 4) was operated in the western portion of the AISA between approximately 1963 and 1975. The wrecking yard, identified on 12 of the 48 aerial photographic prints provided by EPA, was an unpaved and uncovered area of approximately 1 acre that contained over 150 wrecked cars, trucks, and piles of junked automotive engines, frames, and bodies in 1963. Two small buildings were identified along the western fenceline of the yard, and the soil visible between the wrecked vehicles, junk piles, and buildings is darkly discolored throughout much of the yard. This property was never owned or occupied by Aerojet. No information regarding potential fuel and/or solvent storage or use on the property or waste handling at the facility was found. However, on the basis of common operations at automobile wrecking facilities, it is likely that waste oils, fuels, and degreasing solvents were used or handled at this facility. In addition, because of the large amount of scrap metal and acids in the yard, heavy metal contamination may have occurred at this location. Therefore, soil samples collected at the Metzner wrecking yard will be analyzed primarily for volatile and semivolatile organics, and at least one soil sample from each location will be tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*.

1.1.6.16 E.K. Metzner Go-Cart Raceway

The former Metzner Property go-cart raceway (Plate 4) was operated in the northwestern corner of the AISA between approximately 1959 and 1975. The raceway is seen on 15 of the 48 aerial photographic prints provided by EPA. It was an uncovered area of approximately 5 acres that included a parking lot and two buildings north of the track in 1963. This property was never owned or occupied by Aerojet. No information regarding potential fuel and/or solvent storage or use on the property or waste handling at the facility was found. However, on the basis of common operations at automobile racetracks, it is likely that significant quantities of fuels were stored and used at the site, and degreasing solvents were likely used during maintenance and repair of the go-cart motors at this facility. Therefore, soil samples collected at the Metzner go-cart racetrack should be analyzed primarily for volatile organics, and at least one soil sample from each location will be tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*.

1.2 Existing Groundwater Data Evaluation

The most comprehensive compilation of historical groundwater data from the vicinity of the AISA is available in Appendix A of EPA's *Draft Statement of Work (DSOW), Irwindale, Azusa Study Area, San Gabriel Areas 1-4, Los Angeles County, California*, dated July 26, 1990. The printouts of the raw chemical and groundwater level data in Appendix A of the *DSOW* appear to have been provided from a RWQCB database; the printouts are labeled "RWQCB Duplicate Fix." The *DSOW* and the *Public Review Draft Basinwide Technical Plan Report, San Gabriel Basin, Los Angeles, California (CH2M Hill 1990)* have been made available to the RWQCB by EPA for technical review and comment; it is therefore expected that these historical data are readily available to the RWQCB and EPA.

Additionally, Aerojet has previously requested a copy of EPA's *Draft Report of Remedial Investigations, San Gabriel Basin, Los Angeles County, California, 1989.* It is assumed by Aerojet that this document presents a comprehensive assessment of hydrogeologic conditions in the vicinity of the AISA. It is also expected that this information has been made available to the RWQCB, as portions of the RI were conducted in cooperation with the RWQCB. However, EPA has informed Aerojet that it is contrary to EPA policy to make such a draft report publicly available and so Aerojet has not been able to review the report.

It is beyond the scope of this work plan to assimilate, perform quality assurance/quality control verification, and conduct a comprehensive analysis and interpretation of existing chemical, hydrologic, and hydrogeologic data for the AISA, so it is expected that the conceptualized hydrogeologic model of the AISA will evolve as the AISA Site Assessment progresses and QA/QC data verification has been conducted for the data interpreted by Aerojet's technical consultants. The following subsections present a preliminary review of the elements outlined in the Groundwater Data Evaluation Section of the *SOW*. Although Aerojet has provided this information to the extent feasible, similar data requests have not been made of other PRPs in the area or the San Gabriel Basin, and a full understanding of local and basinwide conditions cannot be accomplished until similar data are available from all relevant parties.

1.2.1 Well Inventory

On the basis of the well inventory information presented by EPA in the *DSOW* and more recent information obtained during RWQCB file reviews, 45 municipal and industrial groundwater production wells and 16 groundwater monitoring wells have been identified within a 2-mile radius of the AISA (Plate 5). Of the production wells, 26 are reported to be active, and 19 are reported as not currently in use *(EPA, 1990)*. Available well construction details for these wells are presented in Table 9.

1.2.2 Preliminary Summary of Hydrogeologic Conditions

Regional information for the vicinity of the AISA indicates that coarse gravels, sands, and boulders over 2 feet in diameter extend to about 800 to 1,000 feet in depth, below which are granitic and metamorphic basement rocks. Locally, the alluvial materials are reported to comprise a single major aquifer unit that is vertically continuous and unconfined.

Historical groundwater-level data indicate that the depth to water in the vicinity of the AISA has ranged from approximately 200 to 350 feet below ground surface in the vicinity of the AISA. Over the past 5 years, water levels have continued to decline as a result of drought conditions. The local direction of groundwater flow is also reported to vary from west to southeast with a predominant local direction to the south-southwest. Flow directions are strongly influenced by precipitation and artificial recharge activities at the Santa Fe Reservoir Spreading Grounds, infiltration from the San Gabriel River downstream of the Santa Fe Dam, and groundwater pumping activities.

1.2.3 Summary of Hydrologic Data

This section is a summary of available hydrologic data that has been requested in the *SOW*. The data provided in the following subsections is from the Los Angeles County Department of Public Works (DPW) as reported in their *Hydrologic Report, 1988-89 (DPW, 1990)*. The report contains hydrologic data within Los Angeles County for the period beginning October 1, 1988, and ending September 30, 1989.

1.2.3.1 Stream Flow Data for the San Gabriel River

Stream flow data for the San Gabriel River is presented in Appendix C for two locations in the vicinity of the AISA: the San Gabriel River at Foothill Boulevard, upstream of the Santa Fe Reservoir Spreading Grounds, and a downstream location below Valley Boulevard.

1.2.3.2 Summary of Data for Santa Fe Reservoir Spreading Grounds

Operational data for the Santa Fe Reservoir Spreading Grounds and the amount of water recharged at the spreading grounds during the 1988-1989 water year are provided in Appendix C.

1.2.4 Precipitation Data

Because of the short time available for preparation of this work plan it has not been possible to collect the monthly precipitation data requested in the *SOW*. However, this information is available from the DPW. The seasonal total rainfall reported for the

1988-89 water year for two locations in the vicinity of the AISA are: 13.2 inches recorded by the Azusa Valley Water Company and 10.4 inches reported at the Santa Fe Dam (*DPW, 1990*).

2.0 PHASE I AISA SITE ASSESSMENT FIELD ACTIVITIES

The scope of work presented in this section has been developed in response to the *SOW* and is based upon the current understanding of hydrogeologic conditions and of potential source areas identified within the AISA. A phased approach to data collection and interpretation will be used throughout the AISA Site Assessment to complete the proposed scope of work. Additional discussion of this approach is provided below in Section 2.1.

The objectives of the field investigation are to characterize AISA surface sediments, subsurface gases, vadose zone soil, and groundwater conditions; characterize and assess the presence or absence of chemicals at potential source areas; develop data to support an evaluation of the need for additional site characterization activities, and if warranted, an evaluation of appropriate remedial action alternatives. Table 10 presents a summary of the proposed AISA Site Assessment field activities.

The field investigation work described below will be performed in accordance with procedures outlined in the additional planning documents discussed in Section 1.0, including the Sampling and Analysis Plan (SAP) and the Quality Assurance Project Plan (QAPP). The SAP and QAPP will be submitted to the RWQCB following approval of the work plan and prior to implementation of field activities. The SAP will specify investigation methods and procedures in accordance with relevant RWQCB guidelines for subsurface investigations. The QAPP will present the quality assurance program and related quality control (QC) procedures to be used during the performance of the AISA Site Assessment program.

2.1 General Phase I Considerations

2.1.1 Field Work Phasing

The field activities described in the following sections include soil gas characterization; soil sampling and analysis from shallow-, intermediate-, and deep-zone soil borings; installation of groundwater monitoring wells; and groundwater monitoring, sampling, analysis, and aquifer testing. These activities have been proposed to determine whether potential source areas, identified on the basis of documented site history, have released sufficient quantities of chemicals to soil or groundwater to pose a material threat to human health or the environment. To increase the usefulness and timeliness of data, these activities will be conducted in an integrated but phased program, and the data from earlier phases of the program will be assessed and used by Aerojet to make appropriate modifications in later phases, in consultation with the RWQCB.

This work plan also acknowledges that the appropriate extent of site investigation must be limited by objective evaluation of documented site history, actual field data, and the data requirements of the remedial design process, should remediation be needed. At each step of the investigative process, it is necessary to assess the status of the investigation with respect to these three criteria so that time and resources are not diverted from productive activities to pursue nonproductive issues. For example, this work plan proposes 66 shallow soil borings for soil sampling and chemical analysis, and proposed locations for those borings are illustrated. This proposal is based on available information about the nature and locations of potential source areas. However, Aerojet plans to complete the soil gas characterization before selecting the final number and location of shallow soil borings in any area. Likewise, soil gas and shallow-zone soil boring data will be assessed prior to finalizing the number and location of intermediate-zone soil borings (presently proposed to total 16). At each stage, consideration will be given to the available data to optimize the next stage, consistent with EPA's October 1988 Interim Final *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (OSWER Directive 9355.0-01). At each stage, sampling activities may be moved, increased, or decreased, with approval from the RWQCB, to optimize the site characterization and to use available time, data, and other resources efficiently.

To illustrate, if soil gas characterization data do not indicate VOC concentrations materially above site background in a potential source area where VOCs are the chemicals of concern (e.g., at a degreaser site), then any planned shallow soil sampling boring would not be expected to be productive there. On the basis of discussions with the RWQCB, the proposed boring at such a location would be deleted from the program or moved to a more productive location. Similarly, if chemicals that are likely to be highly retarded in soil (e.g., metals) are not detected in shallow soil samples at a potential source, then any planned deeper soil analyses for these chemicals would not be expected to be productive there.

Conversely, if at the end of the work described herein, additional site characterization is needed to 1) confirm the nature and extent of chemicals actually detected in soil or groundwater so that the need for remediation can be evaluated, or 2) to permit the design of a recommended remedial measure, or 3) if the results of this work indicate that offsite sources exist, then Aerojet will consult with the RWQCB about the nature and scope of additional needed work, and the appropriate parties to undertake such work.

A key element to expediting the overall program is selecting the actual locations for installation of the five proposed monitoring wells. The locations of the two wells to be installed near the northern boundary of the AISA, MW-3 and MW-5, do not depend on the results of any other planned field work, and installation of those wells will proceed concurrently with the first phases of other field work. However, final selection of the three more southerly proposed monitoring well locations (MW-1, MW-2, and MW-4), will depend on analysis of soil gas data. The soil gas data will be used to assess the possible locations of soils containing chemicals that should be avoided as initial well locations to minimize the possibility of cross-contaminating the wells, while at the same time identifying potential well locations likely to be near to but downgradient of potential sources.

To aid in focusing the soil gas field activities toward expediting the installation of the proposed monitoring wells, the AISA has be divided into four geographical subunits. These subunits are defined as the site quadrants formed by the intersection of an east-west trending boundary along 3rd Street and Adelante Street and a north-south trending boundary including Aerojet Avenue and east of Building 310. These boundaries are illustrated on Plate 4.

Initial soil gas survey activities will be concentrated in the southern quadrants, which are expected to contain two of the five proposed monitoring wells (MW-1 and MW-2). Soil gas data will be collected in the two southern quadrants first, so that the final locations of MW-1 and MW-2 can be selected and well installation proceed as soon as possible. Soil gas surveying will then be moved to the southeast corner of the northwest quadrant, to expedite installation of Monitoring Well MW-4, tentatively proposed for installation near LP-1. The remainder of the soil gas survey work will be completed after the well locations have been finalized.

In order to further expedite the interpretation of the soil gas data and the approval of actual monitoring well locations, soil gas data will be submitted to the RWQCB at intervals through the soil gas program. Initially, data will be submitted on a weekly basis for the first four weeks. This initial phase of intensive soil gas review will enable Aerojet, HLA, and the RWQCB to quickly make any necessary adjustments to the program. At the end of the initial four week phase of soil gas field work, the schedule for subsequent interim soil gas data deliveries to the RWQCB will be determined in consultation between Aerojet, HLA, and the RWQCB. However, at least one interim soil gas data report will be made to the RWQCB for each site quadrant.

Areas identified for field investigation have been selected based on the areas of interest identified in Table 2-2 and on Figure 2-1 of the *SOW* and on a review of aerial photographs, and historical and current operational information regarding Aerojet's occupancy of the AISA. Little detailed information was available regarding activities of PRPs other than Aerojet in the AISA, based on Aerojet's review of EPA files. The potential source areas within the AISA proposed for detailed field investigation on the basis of the *SOW* and currently available information are shown on Plate 4, described in Section 1.1.6 and Appendix B, and summarized in Table 8.

The field investigation program described below is dependent on obtaining site access rights in areas not owned by Aerojet, and on the understanding that the RWQCB and/or EPA will provide the necessary access right-of-way approvals for areas not currently owned by Aerojet, if Aerojet is unable to secure necessary access through its own good faith efforts.

2.1.2 Analytical Procedures

The proposed analytical programs for the various phases of the AISA Site Assessment field investigation are discussed in the respective subsections and are summarized in Table 11. The following discussion presents the general approach that will be utilized for parameter identification for the sediment, soil, and groundwater samples proposed for analysis.

All significant chromatographic peaks will be identified by the analytical laboratory when performing tests for purgeable and semivolatile organic compounds, and chromatograms will be specifically checked for xylidene, n-nitrosodimethylamine (NDMA), nitromethane, and trichlorotrifluoroethane (Freon TF, Freon TA is a mixture of Freon TF and acetone) as applicable. The purgeable and semivolatile organic compound test methods proposed in this work plan are based on gas chromatography (GC) analytical techniques, to obtain lower detection limits in comparison with GC/mass spectroscopy (GC/MS) techniques. Detection limit goals, required laboratory quality assurance, and field quality assurance/quality control protocols will be described in detail in the AISA Site Assessment QAPP.

2.2 Soil Gas Characterization Program

The objective of the soil gas characterization program is to assess the presence or absence of VOCs in soil gas in the shallow vadose zone at potential source areas identified on Plate 4 and throughout three general areas within the AISA where historical information regarding specific potential source locations is limited, the former E.K. Metzner property, the Special West Area, and the Proving Grounds. Data obtained from the soil gas characterization program will be used to assess the likelihood that VOCs are present in soil at any location, and to assess the relative lateral distribution of

VOCs in soil. The data will also be used to more effectively locate the shallow zone soil borings (Section 2.4.1) and provide additional data to "fine tune" groundwater monitoring well locations. Soil gas sampling will be conducted using hydraulic equipment capable of driving and withdrawing steel soil gas sampling probes. A mobile analytical laboratory equipped with a gas chromatograph will be used to analyze the collected soil gas samples.

The soil gas sampling program will be initiated by performing shallow vertical profiling to assess the distribution of soil vapors at progressively deeper sampling zones in the interval between 5 and 10 feet below ground surface and to evaluate depths at which a reliable and steady flow of soil gas is likely to be obtained by soil gas sampling pumps, and at which atmospheric effects are likely to be acceptably small. Depth-profile soil gas sampling results will be reviewed to select a consistent and practical target depth to conduct the AISA soil gas characterization program. Two potential source areas within the AISA have been selected to conduct the initial vertical soil gas profiling; the vicinity of former Building 136 and current Building 53, and Leach Bed LB-1 (Plate 4). These locations have been selected because they represent several different types of potential source areas that have been identified within the AISA, including degreasers, an underground gasoline storage tank, a fuel oil storage tank, and leach bed operations.

Soil gas samples will be analyzed for aromatic volatile organic compounds, including: benzene, toluene, ethylbenzene, and xylenes to assess the presence of fuel and petroleum products, and for halogenated volatile organic compounds, including: trichloroethene, perchloroethene, 1,1,1-trichloroethane, carbon tetrachloride, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, vinyl chloride, and Freons to assess the presence of industrial solvents. In addition, other chromatographic peaks detected during the analyses will be reported, with possible chemical identifications and tentative quantifications, as feasible.

As part of the ASIA Site Assessment Report, soil gas concentrations will also be compared with the chemical data from soil samples obtained from the proposed shallow-, intermediate-, and deep-zone soil borings, described below. Procedures for soil gas sampling and analysis will be described in more detail in the SAP and QAPP.

2.2.1 Potential Source Area Soil Gas Investigations

Potential source area soil gas investigations will be performed at potential source areas identified in Section 1.1.6 and shown on Plate 4. Potential source area soil gas investigations will be initiated using a nominal 20 to 30 foot sampling-point grid spacing. The proposed areas of potential source area soil gas sampling are shown on Plate 4; approximately 675 potential source area soil gas sampling points are proposed to be completed. Areas exhibiting significantly elevated soil gas concentrations may be further evaluated using a finer sampling grid as necessary to characterize the areal extent of elevated soil gas concentrations. Soil gas analytical results obtained during the potential source area investigations will be reviewed to adjust the proposed shallow soil boring program illustrated on Plate 4 and described in Section 2.4.1, and also be used to "fine tune" the locations of groundwater monitoring well locations.

2.2.2 Limited Data Area Soil Gas Investigations

Four areas within the AISA have been identified where only general information is available regarding historical operations. These areas include the former property owned by E.K. Metzner, the central portion of the AISA, the Proving Grounds, and the Special West Area (Plate 4). Within the former E.K. Metzner property and the Proving

Grounds are specific locations that have been identified for potential source area soil gas investigations (Plate 4). However, only general information has been available regarding historical operations in the remaining portions of these four general areas. Within these limited data areas, soil gas investigations will be initiated using a nominal 100 foot sampling-point grid spacing. Approximately 250 limited data area soil gas sampling points are proposed, in addition to sampling points associated with specific potential sources. Areas exhibiting significantly elevated soil gas concentrations may be further evaluated using a finer sampling grid as necessary to characterize the areal extent of elevated soil gas concentrations. Soil gas analytical results obtained during the limited data area investigations will be reviewed to adjust the proposed shallow soil boring program illustrated on Plate 4, and to also "fine tune" the locations of groundwater Monitoring Wells MW-1, MW-2 and MW-4.

2.3 Near-Surface Sediment Sampling Program

The objective of the near-surface sediment sampling program is to assess the presence or absence of selected chemicals in near-surface soils along the two drainage courses identified in Section 1.1.6 as being potential source areas (DG-1, DG-3 [Plate 4]), and also at seven transformer locations (TP-1 through TP-7) that have been identified in Section 1.1.6 (Plate 4), where prior to 1982, the transformers were reported to contain PCB transformer fluids.

Drainage Course DG-2, identified as a sampling location in the *SOW* (Figure 2-1), has been omitted from the AISA Site Assessment on the basis that the drainage course receives only present-day stormwater runoff that collects as a result of sheeting from the large asphalt parking lot in the southeast corner of the AISA; DG-2 is only visible in the 1985 aerial photograph. During a rainstorm on January 3, 1991, in which approximately 0.5 inches of rain had already fallen on the previous night, stormwater runoff and discharge conditions at DG-2 and Ponded Liquid Area PL-4 were observed by a HLA hydrogeologist who was conducting a site visit. Runoff along DG-2 consisted only of stormwater from the asphalt parking lot; the runoff tends to pond and slowly infiltrate into the ground at Ponded Liquid Area PL-4. Similar stormwater runoff conditions were also observed at surrounding non-Aerojet industrial facilities and residential neighborhoods in the vicinity of the AISA.

Basin area B-1, also identified as a candidate sediment sampling location in the *SOW* (Figure 2-1) on the basis of historical aerial photographs, has been omitted from the AISA Site Assessment. This former feature was omitted from the AISA Site Assessment because it has since been excavated to an approximate depth of 170 feet below the original land surface that existed when B-1 was present. The excavation was conducted by sand and gravel mining and/or landfill disposal operations at the Azusa Land Reclamation Company (ALR). Additionally, during a site visit of the ALR facility by a HLA hydrogeologist on January 3, 1991, vehicle maintenance and landfill disposal operations and remnants of sand and gravel mining operations were observed in the subject area (B-1). For these reasons, chemicals identified in the current near surface and/or vadose zone soil of the subject area would be attributed to present-day and/or historical operations conducted by ALR, and not be representative of historical operations from the AISA. However, the results of soil gas and shallow zone soil boring analyses from DG-1 will be reviewed to further assess the necessity for an Aerojet investigation of B-1.

2.3.1 Drainage Courses

Soil samples for chemical analysis will be collected from four locations along each sampled drainage course (DG-1 and DG-3) as shown on Plate 4; a total of 8 sampling locations is proposed. Relatively undisturbed soil samples submitted for chemical analysis will be obtained from approximate depths of 2 inches, 1 foot, and 2 feet bgs using a hand-driven split-barrel sampler containing stainless steel soil sample collection tubes.

Soil samples collected from DG-1 will be analyzed for halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; dioxins and furans using EPA Test Method 8280; chlorate using ion chromatography; and one soil sample will be collected from the uppermost native soil zone at each location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

Soil samples from DG-3 will be analyzed for halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; chlorate using ion chromatography; and one soil sample will be collected from the uppermost native soil zone at each location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.3.2 PCB-Containing Transformers

One soil sample for chemical analysis will be collected from each transformer area (TP -1 through TP-7) at the locations shown on Plate 4. Relatively undisturbed soil samples will be obtained from an approximate depth of 2 inches bgs using a hand-driven split-barrel sampler containing stainless steel soil sample collection tubes.

Soil samples collected from the transformer locations will be analyzed for PCBs using EPA Test Method 8080. In the event that PCBs are identified in any of the samples, the respective sample(s) will also be tested for dioxins and furans using EPA Test Method 8280.

2.4 Shallow and Intermediate Vadose Zone Characterization Program

The objectives of the shallow and intermediate vadose zone characterization program are to characterize lithologic conditions within the AISA and assess the presence or absence of selected chemicals in soil at potential source area locations identified in Section 1.1.6 (Plate 4). To accomplish these objectives, a phased approach of performing soil borings will be utilized, beginning with the performance of shallow zone soil borings at potential source areas, followed by the completion of intermediate zone soil borings at selected potential source area locations.

The shallow and intermediate zone soil borings are proposed to be completed using the hollow-stem auger drilling method in order to minimize potential disturbance of the chemical composition of soil samples due to potential effects of drilling mud and/or compressed air. Relatively undisturbed soil samples to be submitted for chemical analysis will be obtained using a split-barrel sampler containing stainless steel soil sample collection tubes.

In the event that hollow-stem auger drilling using relatively heavy and high-powered commercially available equipment is repeatedly unable to advance soil borings to acceptable depths due to site geological conditions, then the vadose zone soil drilling program will be temporarily suspended, and Aerojet, HLA, and the RWQCB will consult on the selection of an alternative drilling method that will acceptably balance reliable penetration and soil sample chemical quality, or other appropriate modifications to the program scope, approach, or techniques.

All soil cuttings generated during the shallow and intermediate vadose zone characterization program will be contained in drums or mobile bins until proper offsite disposal can be arranged following the receipt of analytical chemical results. Drilling, lithologic logging, and soil sample collection and analysis will be conducted in accordance with detailed procedures described in the SAP and QAPP.

2.4.1 Shallow Zone Soil Borings

To fulfill the requirements of the *SOW*, and based on available information, a minimum of one shallow zone soil boring (SZB) is currently proposed at each potential source area identified in this work plan (Section 1.1.6 [Plate 4]), except for potential source areas DG-1, DG-3, and TP-1 through TP-7, which are incorporated into the Near Surface Sediment Sampling Program, as described above in Section 2.3. To the extent practical, the preliminary locations for each of the proposed SZBs are shown on Plate 4; 66 SZBs are currently proposed. The preliminary proposed locations have been selected on the basis of historical information and aerial photographs reviewed during the preparation of this work plan. Results from the soil gas characterization program (Section 2.2), as available, will be used to more productively select actual SZB sampling locations.

The SZBs are proposed to be completed to a target depth of approximately 40 feet bgs. Borings will be continuously logged for lithologic characterization as drilling proceeds, and assuming geologic conditions permit, relatively undisturbed soil samples will be collected at 5-foot intervals to a depth of 40 feet (with the first sample collected at or near the ground surface).

Because of the coarse alluvial sand, gravel, and large boulder deposits that comprise the local geology, sampling depths and/or recovery may be limited. If relatively undisturbed soil samples cannot be collected at the depths nominally specified above, sampling zones will be selected by the HLA field geologist. At each SZB, attempts will be made to recover a minimum of 5 soil samples representative of the vadose zone for chemical analysis.

An organic vapor analyzer (OVA) will be used to screen soil samples for the presence of VOCs. Samples will also be checked for other evidence of contamination including soil discoloration, chemical odors, and the presence of liquid-phase chemicals. To assess the presence or absence of chemicals in the vadose zone profile of each SZB, relatively undisturbed soil samples collected from near the ground surface and from the approximate depths of 20 and 40 feet bgs, and those samples exhibiting the highest and lowest OVA reading, will be submitted for chemical analysis. A minimum of 5 soil samples will be submitted for chemical analysis from each SZB from which at least 5 suitable soil samples are recovered.

2.4.1.1 Chemical Analysis of Shallow Zone Soil Samples

Soil samples submitted for chemical analysis from the SZBs will be analyzed for a suite of parameters selected to characterize each general type of potential source area category targeted for SZBs. The selected suite of chemical parameters to characterize each of potential source area categories is presented in the respective subsection presented below.

2.4.1.1.1 Degreasers

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at degreaser locations DE-1a, DE-1b, DE-4, and DE-6, soil samples will be tested for halogenated volatile organic compounds using EPA Test Method 8010, and one soil sample will be collected from the uppermost native soil zone at each location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.1.1.2 Drum Storage Areas

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at drum storage locations DR-2 through DR-13, DR-15 through DR-24, DR-26, and DR-7, soil samples submitted for chemical analysis will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; and one soil sample will be collected from the uppermost native soil zone at each location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample. Soil samples from DR-2, DR-3, DR-11 and DR-12 will also be tested for chlorate using ion chromatography.

2.4.1.1.3 Sumps

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at sump location S-1, soil samples will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; and one soil sample will be collected from the uppermost native soil zone and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.1.1.4 Storage Tanks

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at storage tank locations T-1a, T-4, and T-5, soil samples will be tested for: total petroleum hydrocarbons using modified EPA Test Method 8015; aromatic volatile organic compounds using EPA Test Method 8020; and lead (T-4 and T-5 only) using EPA Test Method 6010. Soil samples submitted for chemical analysis from T-1b will be analyzed for volatile organic compounds using EPA Test Method 8010, and at the direction of the EPA/RWQCB, one soil sample will be collected from the uppermost native soil zone and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional testing for cyanide and metals will be performed only if elevated. Concentrations are detected in the uppermost sample.

Soil samples submitted for chemical analysis from T-2 and T-3 will be tested for: halogenated and volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; and one soil sample will be collected from the uppermost native soil zone at each location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.1.1.5 Waste Disposal Areas

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone associated with activities at waste disposal location WD-1, soil samples will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; dioxins and furans using EPA Test Method 8280; chlorate using ion chromatography; and one soil sample will be collected from the uppermost native soil zone and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.1.1.6 Burn Area

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at the burn area location BA-1, soil samples will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; dioxins and furans using EPA Test Method 8280; chlorate using ion chromatography; and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.1.1.7 Stain and Liquid Areas

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at stain and liquid area location SL-1, soil samples will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; dioxins and furans using EPA Test Method 8280; chlorate using ion chromatography; and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

Soil samples collected from stain and liquid areas SL-5 and SL-6 will be analyzed for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.1.1.8 <u>Industrial Waste Treatment Systems</u>

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at industrial waste treatment locations WT-1 and WT-2, soil samples will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; chlorate using ion chromatography; and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.1.1.9 <u>Ponded Liquid Areas</u>

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at ponded liquid locations PL-2, and PL-5, soil samples will be submitted for chemical analysis as follows: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample. In addition, soil samples obtained from PL-2 and PL-5 will be analyzed for chlorate using ion chromatography, and samples from PL-5 will be analyzed for dioxins and furans using EPA Test Method 8280.

2.4.1.1.10 Leach Beds

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at leach beds LB-1 through LB-4, soil samples will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample. Soil samples obtained from LB-1, LB-2, and LB-4 will also be analyzed for chlorate using ion chromatography, because of the association of solid propellant use adjacent to these leach beds.

2.4.1.1.11 Leach Pits

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at leach pit locations LP-1 LP-2, LP-6, and LP-7, soil samples will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270;

and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.1.1.12 E.K. Metzner Automobile Wrecking Yard

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at the former E.K. Metzner wrecking yard location, soil samples will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; semivolatile organic compounds using EPA Test Method 8270; and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.1.1.13 E.K. Metzner Go-Cart Raceway

To assess the presence or absence of potential chemical concentrations in the shallow vadose zone at the former E.K. Metzner go-cart raceway, soil samples will be tested for: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020; and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample.

2.4.2 Intermediate Zone Soil Borings

Sixteen intermediate zone soil borings (IZBs) are proposed for completion during the AISA Site Assessment. In accordance with the requirements of the *SOW* and/or the

EPA/RWQCB, 6 of the 16 IZBs have been located at potential source areas LB-3, LB-4, LP-2, LP-3, PL-1, and BA-1 (Plate 4); an IZB has not been located at LP-1 because it has been targeted for a deep zone soil boring that will provide the same data (Section 2.5.1). The preliminary proposed locations for the remaining 10 IZBs have been targeted for potential source areas that appear to have received liquids or where liquid releases may have occurred. These areas are LB-1, LB-2, SL-1 (two locations), SL-5, DR-1, DE-6, WT-1, WT-2, and the former E.K. Metzner Automobile Wrecking Yard (Plate 4). The final IZB program will be based upon interpretation of the results from the soil gas characterization and the shallow zone soil borings, as well as any new historical site use information, to more accurately target source areas that may exist within the AISA.

The IZBs are proposed to be completed to a target depth of approximately 100 feet bgs. Borings will be continuously logged for lithologic characterization as drilling proceeds, and assuming geologic conditions permit, relatively undisturbed soil samples for chemical analysis will be collected at 5-foot intervals to a depth of 40 feet (with the first sample collected at or near the ground surface), and at 20-foot intervals thereafter.

Because of the coarse alluvial sand, gravel, and large boulder deposits that comprise the local geology, sampling depths and/or recovery may be limited. If relatively undisturbed soil samples cannot be collected at the depths nominally specified above, sampling zones will be selected by the HLA field geologist. Attempts will be made to recover a minimum of 8 soil samples representative of the vadose zone soil profile from each IZB for chemical analysis.

An OVA will be used to screen soil samples for the presence of VOCs. Samples will also be checked for other evidence of contamination including soil discoloration, chemical odors, and the presence of liquid-phase chemicals. To assess the presence or absence of chemicals in the vadose zone profile of each IZB, relatively undisturbed soil samples collected from near the ground surface, those exhibiting the highest and lowest OVA reading between 0 and 40 feet bgs, and those from the approximate depths of 20, 40, 60, 80, and 100 feet bgs, will be submitted for chemical analysis. A minimum of 8 soil samples will be submitted for chemical analysis from each IZB from which at least 8 suitable soil samples are recovered.

2.4.2.1 Chemical Analysis of Intermediate Zone Soil Samples

Soil samples submitted for chemical analysis from the IZBs will be analyzed for the same suite of parameters that have been selected to characterize the nearest general type of potential source area described in Section 2.4.1.1.

2.5 Hydrogeologic Characterization Program

The objectives of the hydrogeologic characterization program are to characterize lithologic conditions within the AISA, assess the presence or absence of selected chemicals in soil of the vadose zone profile at selected potential source area locations and at potential background locations within the AISA, characterize the physical properties of the vadose zone soil profile at selected locations throughout the AISA, evaluate localized groundwater flow directions and horizontal hydraulic gradients beneath the site, assess the presence or absence of selected chemicals in groundwater of the shallow aquifer at proposed monitoring well locations, and estimate hydraulic properties of the shallow aquifer beneath the AISA. To fulfill these objectives, deep zone soil borings will be integrated with the installation of groundwater monitoring wells. Additionally, aquifer testing and groundwater monitoring activities will be included in the hydrogeologic characterization program.

On the basis of the potential source areas identified in the AISA, a conceptual model of the regional groundwater system, and requirements of the *SOW*, five deep zone soil borings and groundwater monitoring wells are proposed for installation. Three of these locations coincide with potential source areas and two locations have been selected to characterize vadose zone soil and groundwater conditions along the northern boundary of the AISA (at potential "background/upgradient" locations). The following sections describe the scope of work to be performed to complete the proposed hydrogeologic characterization program.

2.5.1 Deep Zone Soil Borings

Five deep zone soil borings (DZBs) are proposed to be performed during the AISA Site Assessment. The borings will be completed as groundwater monitoring wells as described in Section 2.5.2; their approximate locations are shown on Plate 4, where they are designated MW-1 through MW-5. Three of the DZB locations have been selected to evaluate the presence or absence of selected chemicals in vadose zone soils near potential source areas that have been identified as priority sites within the AISA, and the forth and fifth locations have been selected to assess potential "background" vadose zone soil conditions (Plate 4). In accordance with the requirements of the *SOW*, two of the five DZBs, MW-1 and MW-2, have been located at Leach Beds LB-1 and LB-2, respectively (Plate 4). The proposed locations for the remaining DZBs are at Leach Pit LP-1 (MW-4), and in two areas located along the northern boundary of the AISA selected to represent potential locations for characterization of "background" vadose zone soil conditions (MW-3 and MW-5).

The first DZB to be drilled will be either MW-3 or MW-5 and it will be used to characterize the extent of the vadose zone soil profile and to evaluate the feasibility of collecting relatively undisturbed soil samples at depth with a split-barrel sampler. It is anticipated that the DZBs will be completed to an approximate depth of 350 feet bgs. Borings will be continuously logged for lithologic characterization as drilling proceeds, and if geologic conditions permit, relatively undisturbed soil samples for chemical analysis will be collected at 5-foot intervals to a depth of 40 feet (with the first sample collected at or near the ground surface), at 20-foot intervals to 100 feet, and at 50-foot intervals thereafter.

Because of the coarse alluvial sand, gravel, and large boulder deposits that comprise the local geology, sampling depths and/or recovery may be limited. If relatively undisturbed soil samples cannot be collected at the depths nominally specified above, sampling zones will be selected by the HLA field geologist.

An OVA will be used to screen soil samples for the presence of VOCs. Samples will also be checked for other evidence of contamination including soil discoloration, chemical odors, and the presence of liquid-phase chemicals. To assess the presence or absence of chemicals in the vadose zone profile of each DZB, relatively undisturbed soil samples collected from near the ground surface, those exhibiting the highest and lowest OVA reading between 0 and 40 feet bgs, and those from approximately 20, 40, 60, 80, 100, 150, 200, 250, 300, and 350 feet bgs, will be submitted for chemical analysis. A minimum of 13 soil samples from each DZB will be submitted for chemical analysis.

Soil samples submitted for chemical analysis from the DZBs will be analyzed for: halogenated and aromatic volatile organic compound using EPA Test Methods 8010 and 8020, semivolatile organic compounds using EPA Test Method 8270; and one soil sample will be collected from the uppermost native soil zone at each boring location and tested for cyanide and the full suite of metals identified in Table 2-6 of the *SOW*. Additional soil testing for cyanide and metals will be performed only if elevated concentrations are detected in the uppermost sample. Additionally, a minimum of 11 relatively undisturbed soil samples representative of the vadose zone soil profile at each DZB will be collected and tested for: total organic carbon using EPA Test Method 9060; pH using EPA Test Method 9045; and moisture content using American Society of Agronomy Method Number 9, Part 1, or American Society for Testing and Materials Method D-2216.

Cuttings generated during the drilling process will be contained in drums or mobile bins until proper offsite disposal can be arranged following the receipt of analytical chemical results. Drilling, lithologic logging, and soil sample collection and analysis will be conducted in accordance with procedures to be described in the SAP and QAPP.

2.5.2 Groundwater Monitoring Well Installation

Following completion of each DZB, the existing borehole will be advanced into the saturated zone of the shallow aquifer to permit the construction of a groundwater monitoring well. If the mud-rotary drilling method is used to complete the monitoring well borings, borehole geophysical logging will be conducted using natural gamma, spontaneous potential, resistivity, and caliper logging techniques for each boring. In the event that a drilling method other than mud rotary is used to complete the monitoring well borings, only natural gamma logs can be produced.

The proposed locations of the five groundwater monitoring wells (MW-1 through MW-5) coincide with the DZB locations and are shown on Plate 4. The locations of

MW-1 through MW-5 will permit an evaluation of the presence or absence of chemicals in shallow groundwater at these locations. The distribution of these wells should also permit an assessment of localized groundwater flow directions and horizontal hydraulic gradients beneath the AISA.

The groundwater monitoring wells will be constructed of 6- to 8-inch mild steel blank casing and stainless steel well screen. To mitigate the potential for corrosion between the differing metal types, an insulator joint will be placed between the mild steel well casing and the stainless steel well screen.

On the basis of current water levels measured in the vicinity of the AISA and historical water-level fluctuations in the basin, and in accordance with the agreement reached between Aerojet, EPA, and the RWQCB during the teleconference on August 23, 1991, the monitoring wells will be continually screened from 20 feet above the top of the saturated zone of the shallow aquifer (currently reported to exist at an approximate depth of 355 feet bgs), to a depth of approximately 30 feet below the top of the saturated zone of the shallow aquifer (approximately 385 feet bgs). A 5-foot long blank silt trap will be installed at the bottom of each well. The well screen slot size and sand pack gradation will be compatible with the aquifer materials based on sieve analyses. The sand pack will be tremied into the borehole annulus to a height of about 10 feet above the top of the well screen. A minimum 5-foot thick bentonite seal will be tremied into place above the sand pack, followed by a sand-cement/bentonite-cement sanitary seal to the surface.

Following installation, each monitoring well will be developed and fitted with a dedicated pump appropriate for purging and sampling purposes. The top of each well casing will be surveyed by a registered land surveyor to obtain reference elevations at each monitoring well location for data correlation.

Procedures and criteria for monitoring well construction, installation, and development will be presented in the SAP and QAPP.

2.5.3 Aquifer Testing

An aquifer testing program will be conducted during the AISA Site Assessment. The aquifer testing program will consist of step-drawdown, constant-rate discharge and recovery tests. The objective of the aquifer testing program will be to estimate the aquifer transmissivity and hydraulic conductivity for use in assessing advective transport rates in groundwater flow beneath the site and to assess the potential effects of long-term local aquifer pumping. To accomplish the objectives of the aquifer testing program, proposed Monitoring Well MW-1 is tentatively proposed for use as a pumping well and Azusa Land Reclamation Company (ALRC) Monitoring Well MW-9 is tentatively proposed for use as an observation well for the testing program (based on the assumption that site and monitoring well access is granted by ALRC).

The aquifer testing program will begin with a step-drawdown test followed by a period of recovery monitoring. The step-drawdown test will consist of pumping MW-1 and monitoring water-level drawdown in MW-9. MW-1 will be pumped using at least three different discharge rates. Each discharge rate will be maintained for at least 100 minutes. Water levels in MW-1 and MW-9 will be recorded using pressure transducers and a portable data-logger system. Following pumping, water-level recovery will be recorded until water levels return to at least 80 percent of their pre-pumping levels in MW-1 and MW-9. The purpose of the step-drawdown and recovery tests is to provide a preliminary estimate of transmissivity and hydraulic conductivity to be used to select an appropriate discharge rate for the constant-rate discharge test.

The constant-rate discharge test will consist of pumping MW-1 for a maximum of 24 hours. Water-level drawdown will be recorded in MW-1 and MW-9 using pressure transducers and a portable data-logger system. After pumping is stopped for the constant-rate discharge test, water level recovery will be recorded until water levels return to at least 80 percent of their pre-pumping levels in MW-1 and MW-9. The primary purpose of the constant-rate discharge and recovery tests will be to more accurately evaluate the transmissivity and hydraulic conductivity of the shallow aquifer zone.

Because of the large volumes of groundwater that are expected to be pumped during the aquifer testing program, it is anticipated that a temporary National Pollution Discharge Elimination System (NPDES) permit will need to be acquired from the RWQCB prior to implementation of the aquifer testing program. In accordance with the requirements of the *SOW*, additional details and procedures for the aquifer testing program will be described in the SAP and QAPP.

2.5.4 Groundwater Monitoring

The groundwater monitoring program will comprise groundwater level measurement surveys and groundwater sampling events. The details of each are presented below.

2.5.4.1 Groundwater Level Measurement Surveys

Following completion of monitoring well development and a groundwater stabilization period, groundwater level measurement surveys will be conducted on at least a monthly basis for one year to assess groundwater flow directions and horizontal hydraulic gradients beneath the AISA. Groundwater level data will be collected from all five proposed wells and from wells on neighboring properties, assuming that site access or data sharing agreements can be reached. Groundwater level data will be used to construct potentiometric surface maps and hydrographs that will aid in identifying potential seasonal fluctuations and/or variations in flow directions and horizontal hydraulic gradients in the vicinity of the AISA. The frequency of groundwater level measurements may be reevaluated following review of data and approval of the RWQCB. Groundwater level surveys will be conducted in accordance with procedures to be described in the SAP and QAPP.

2.5.4.2 Groundwater Sampling and Analysis

Following the completion of well development, each of the five proposed monitoring wells to be installed will be incorporated into a groundwater sampling program. Groundwater sampling events will be performed on a monthly basis for three months; the frequency of subsequent sampling events will be evaluated based on a review of chemical analytical results from the first three months and approval of the RWQCB.

Prior to sample collection, the groundwater level in each monitoring well will be measured and the well will be purged using its dedicated submersible pump until at least three well-casing volumes have been removed and field water quality parameters of pH, temperature, and specific conductance (which will be monitored during purging activities) indicate that chemical stabilization is achieved.

Groundwater samples collected during the initial three monthly sampling events will be analyzed for the following suite of chemical parameters: halogenated and aromatic volatile organic compounds using EPA Test Methods 8010 and 8020;

semivolatile organic compounds using EPA Test Method 8270; cyanide using EPA Test Method 9012; nitrate using EPA Test Method 353.2; chlorate using ion chromatography; and the full suite of metals identified in Table 2-7 of the *SOW*. Additionally, if PCBs are detected in sediment samples, the analysis of PCBs using EPA Test Method 8080 will be incorporated into the groundwater sampling program.

The analytical suite for subsequent groundwater sampling events will be evaluated based on the analytical chemical results of the first groundwater sampling event and approval of the RWQCB. At a minimum, subsequent groundwater sampling events will include halogenated and aromatic volatile organics using EPA Test Methods 8010 and 8020, respectively, or an analogous GC/MS test method such as EPA Test Method 8240.

2.6 Sample Management and Quality Assurance

Details regarding sample management will be provided in the SAP. A record of all samples collected will be kept in a field notebook. The record will include information regarding sample matrix and type, sample location and depth, collection date and time, sampling personnel names and affiliations, and additional description as applicable. Additional data documenting the technical details of each sampling event, such as well purging records, will be permanently recorded on standardized forms. Quality assurance protocols will be described in the QAPP and SAP. The appropriate portions of the SAP and QAPP will be approved by the RWQCB before field activities governed by those portions will start.

3.0 AISA SITE ASSESSMENT REPORT

Following completion of the field program and receipt of all laboratory chemical results, HLA will prepare a comprehensive report that will include a description of site location and history, geology/hydrogeology, climatology and hydrology. The report will update available historical and relevant general technical information on the AISA and surrounding sites, describe activities performed during the AISA Site Assessment, present data collected, present an interpretation of these data, with conclusions and a conceptual model regarding site hydrogeologic conditions, and as appropriate, provide recommendations regarding additional work. The report will contain, but not be limited to, soil gas concentration contour maps, soil and monitoring well boring lithologic and geophysical logs, monitoring well completion diagrams, groundwater elevation contour maps, soil chemistry data, results from aquifer tests, chemical results from the three monthly groundwater sampling events, and QA/QC data.

4.0 PHASE II AISA SITE ASSESSMENT FIELD ACTIVITIES

On the basis of the results obtained during the Phase I AISA Site Assessment and recommendations presented in the Phase I Site Assessment Report, additional field activities may be required to further characterize and/or remediate surface sediment, subsurface gas, vadose zone soil, and/or groundwater conditions. The scope of services and details necessary to complete a Phase II Site Assessment, if warranted, would be described in a subsequent Work Plan and SAP that would be submitted to the RWQCB for review and approval prior to the initiation of field activities.

5.0 SCHEDULE

A schedule outline for the scope of work proposed in this Work Plan is presented below. The project schedule has been developed based on the approach of subdividing the AISA into quadrants as described in Section 2.1.1, and on the assumption that site access arrangements at properties other than those currently owned by Aerojet will not interfere with field investigation activities. It is Aerojet's understanding that the RWQCB and/or EPA will provide in a timely fashion the necessary access right-of-way approvals for areas not currently owned by Aerojet, if Aerojet is unable to obtain such approvals through its own good faith efforts.

Planning Documents. The schedule will begin with the submittal of the project Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP). These documents are scheduled to be submitted to the RWQCB and EPA on October 10, 1991.

Soil Gas Characterization Program. The soil gas characterization field program is projected to be completed within 5 months of RWQCB approval of the AISA Site Assessment SAP and QAPP. Interim soil gas data will be submitted to the RWQCB as described in Section 2.1.1. A Soil Gas Technical Memorandum summarizing the results of this program will be submitted to the RWQCB within 30 days of receipt of all of the soil gas chemical results.

Near-Surface Sediment Sampling Program. The near-surface sediment sampling program will be started near the onset of the field program and is projected to be completed within 15 working days.

Shallow Zone Soil Borings. It is projected that the proposed shallow zone soil borings in each quadrant will be initiated following the completion of each quadrant of soil gas sampling as described in Section 2.1.1. It is anticipated that approximately 3 months will be required to complete the 66 shallow zone soil borings. A Shallow Zone

Soil Boring Technical Memorandum summarizing the results of this program and also including the results of the near-surface sediment sampling program will be submitted to the RWQCB within 60 days of receipt of all of the associated laboratory chemical results.

Intermediate Soil Borings. The proposed intermediate zone soil borings are projected to be completed within 3 months of the receipt of RWQCB approval of the Shallow Zone Soil Boring Technical Memorandum.

Hydrogeologic Characterization Program. The proposed hydrogeologic characterization program is projected to be completed within approximately 1 year of the start of the AISA field program. As described in Section 2.1.1, groundwater Monitoring Wells MW-3 and MW-5 will be installed at the onset of the field program. The remaining monitoring wells will be installed following the completion of the soil gas sampling in the respective quadrants as described in Section 2.1.1. Following installation and development of the monitoring wells, three monthly groundwater sampling events will be conducted. The frequency of subsequent sampling events will be reevaluated based on a review of chemical data from the first three groundwater sampling events and approval of the RWQCB. After the first monthly groundwater sampling event, the aquifer testing program will be initiated and completed within 3 months.

AISA Site Assessment Report. Within 4 months following completion of all field investigation activities and receipt of all final laboratory analytical chemical results, the AISA Site Assessment Report will be submitted to the RWQCB.

6.0 REFERENCES

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TABLES

TABLES

Table 1. Soil Analytical Results - Building 53 Waste Fluid Tank (T-3)

Sample Number	Sample Site	TCE (ppm)	Tin (ppm)	Lead (ppm)	Arsenic (ppm)
1/2	1	0.128	11.1	10.3	1.0
3/4	2	0.089	17.7	13.2	1.0
5	?	0.150	NA	NA	NA
6	?	0.012	NA	NA	NA
7	?	0.200	NA	NA	NA
8	?	0.420	NA	NA	NA
10	2	0.012	NA	NA	NA
12	2	0.030	NA	NA	NA

NA = Not applicable.

Table 2. Surface Water Analytical Results - Mercury Release

Parameter	Limit(1)	"West Pond"(2)	Concentration (ppm) Sample 1	2	3	4
Mercury	<0.02	0.012	0.024	0.014	0.024	0.023
Total Dissolved Solids	1000	365				
Chloride	250	11.2				
Chloride + Sulfate	500	39				
Nitrate	45	0.9				
Chromium VI	0.05	0.03				
Boron	2	0.22				
Fluoride	1.5	0.4				

(1) Maximum allowable limit.

(2) Probably within the drainage course within the Proving Grounds area.

Table 3. Soil Analytical Results - Building 322 Fuel Tank (T-5) Soil Analyses

	Concentration			
Parameter	AJ1-7'	AJ1-15'	AJ2-7.5'	AJ2-15'
Benzene	0.031	0.038*	0.032	0.033
Toluene	(0.020)	0.024*	0.043	(0.020)
Chlorobenzene	(0.008)	(0.008)	(0.008)	(0.008)
Ethyl benzene	(0.005)	0.019	0.021	(0.005)
1,3-dichlorobenzene	(0.020)	(0.020)	(0.020)	(0.020)
1,2 & 1,4-dichlorobenzene	(0.030)	(0.030)	(0.030)	(0.030)
Meta xylene	(0.030)	0.053	0.044	(0.030)
Ortho & Para xylene	(0.030)	0.054	0.061	(0.030)
Gasoline (mg/kg)	9.0	5**	1500	(5)

* Compound detected in the laboratory reagent blank.

** Indicates an estimated value.

(0.008) Parenthesis indicate compound not detected. The value within the parenthesis is the limit of detection for that compound.

Concentrations are milligrams per kilogram.

Table 4. Analytical Results - Cations, Leach Bed Pond "B" (LB-2)

Sample Date	Sample Type	Calcium ppm	Magnesium ppm	Sodium ppm	Iron ppm	Manganese ppm	Aluminum ppm	Boron ppm	Chromium ppm	Silica ppm
12/01/56	plating rinse	70	22	52	0	0	0	0	0.09	20
07/09/57	wash down	61	17	24	0	0	0	0	0	8
08/23/57	poss. plating rinse	240	148	1170	0	0	0	0	0	33
12/??/61		65	16	32	0	0	0.03	0	0	16
12/??/61	tap water	80	2.2	24	0	0	0	0	0	19
12/05/57	?	88	17	12	0	0	0.07	0	0.16	16
??/??/62	?	156	15	1015	0	0	0	0	0	11
03/??/62	?	80	14	31	0	0	0.12	0	0.02	13
08/28/58	effluent to pond B	56	12	11	0.02	0.2	0	0	0	12
08/27/58	Pond B waste	36	12	54	0	0	0	0	0.078	11
12/??/62	?	?	?	?	?	?	?	?	?	?
05/21/58	Pond B waste	72	8	?	?	?	?	0	?	?
05/21/58	effluent to pond B	?	13	?	?	?	?	0	?	11
12/09/58	effluent to pond B	66	?	?	?	?	?	?	0.042	12
04/14/59	effluent in pond B	64	15	5	0.01	0	0.1	0	0	14
??/??/63	?	na	na	na	na	na	na	0.02	na	na
07/17/59	effluent in pond B	80	na	na	na	na	na	0	na	na
??/??/64	effluent	64	11	15	0	0	0	0	0	13
??/??/64	?	58	11	20	?	?	?	0	?	11
08/04/59	effluent to pond B	62	13	17	0	0	0	0	0.021	15
08/04/60	effluent in pond B	51	13	14	0	0	0.15	0	0	12
01/26/60	?	64	12	15	0	0	0	0	0	10
01/26/60	effluent to pond B	78	13	17	0	0	0	0	0	12
10/18/61	effluent to pond B	68	11	34	0	0	0	0	0.27	13
10/18/61	effluent in pond B	56	11	46	0	0	0	0	0.145	9
12/15/62	waste water in pond	na	na	na	na	na	na	na	0.01	na
12/15/62	waste water in ditch	na	na	na	na	na	na	na	trace	na
09/25/62	effluent to pond B	51	10	24	0	0	0	0	0.145	13

**Table 4. Analytical Results - Cations, Leach Bed Pond "B" (LB-2)
(continued)**

Sample Date	Sample Type	Calcium ppm	Magnesium ppm	Sodium ppm	Iron ppm	Manganese ppm	Aluminum ppm	Boron ppm	Chromium ppm	Silica ppm
09/25/62	effluent in pond B	34	10	124	0	0	0	0.3	0.155	14
03/12/63	effluent in ditch	na	na	na	na	na	na	na	0	na
01/17/63	effluent in pond	na	na	na	na	na	na	na	0	na
01/17/63	effluent in ditch	na	na	na	na	na	na	na	0	na

? = copy unreadable
na = not analyzed
Reference = Aerojet, 1983, Exhibit 3, p. 6-41

Table 4. Analytical Results - Anions, Leach Bed Pond "B" (LB-2)

Sample Date	Sample Type	Hydroxide ppm	Carbonate ppm	Bicarbonate ppm	Chloride ppm	Sulfate ppm	Nitrate ppm	Sulfide ppm	Fluoride ppm	Phosphate ppm	Cyanide ppm
12/01/56	plating rinse	0	0	264	24	28	118	0	0.7	1.2	0
07/09/57	wash down	0	0	227	14	33	40	0	0.2	0.1	0
08/23/57	poss. plating rinse	0	29	254	690	2360	70	0	2.4	1.1	0
12/?/61	?	0	0	198	12	26	110	0	1.6	1	0
12/?/61	tap water	0	0	249	20	28	98	0	0.4	0	0
12/05/57	?	0	0	212	14	64	66	0	0.6	0.9	0
?/?/62	?	0	0	452	80	88	4200	0	0	0	0
03/?/62	?	0	0	171	20	40	140	0	0.6	0	0
08/28/58	effluent to pond B	0	0	193	14	31	0	0	1.2	0	0
08/27/58	Pond B waste	0	0	122	14	49	102	0	1.2	0	0
12/?/62	?	0	0	234	6	36	0	0	0	0	0
05/21/58	Pond B waste	0	0	171	8	51	8	0	0.3	0	0
05/21/58	effluent to pond B	0	0	256	10	98	0	0	0.3	0	0
12/09/58	effluent to pond B	0	0	222	4	38	0	0	0	0.1	0
04/14/59	effluent in pond B	0	0	215	10	36	0	0	2	0	0
?/?/63	?	na	na	na	na	na	na	na	na	na	na
07/17/59	effluent in pond B	na	na	na	na	na	na	na	na	na	na
?/?/64	effluent	0	19	18?	?	4?	0	0	0.4	0.7	0
?/?/64	?	0	10	195	8	41	0	0	0.4	0.6	0
08/04/59	effluent to pond B	0	0	202	12	35	32	0	0.4	0.1	0
08/04/60	effluent in pond B	0	0	186	8	40	8	0	0.2	0.1	0
01/26/60	?	0	0	222	8	46	0	0	0.5	0	0
01/26/60	effluent to pond B	0	0	230	8	80	0	0	0.5	0.2	0
10/18/61	effluent to pond B	0	0	193	14	64	50	0	1.2	0.2	0
10/18/61	effluent in pond B	0	0	176	10	53	84	0	1.4	0.2	0
12/15/62	waste water in pond	na	na	na	na	na	na	na	na	na	na
12/15/62	waste water in ditch	na	na	na	na	na	na	na	na	na	na
09/25/62	effluent to pond B	0	0	190	6	48	6	0	0.4	0.2	0

Table 4. Analytical Results - Anions, Leach Bed Pond "B" (LB-2)
(continued)

Sample Date	Sample Type	Hydroxide ppm	Carbonate ppm	Bicarbonate ppm	Chloride ppm	Sulfate ppm	Nitrate ppm	Sulfide ppm	Fluoride ppm	Phosphate ppm	Cyanide ppm
09/25/62	effluent in pond B	0	0	188	11	60	200	0	0.9	0.5	0
03/12/63	effluent in ditch	na	na	na	na	na	na	na	na	na	na
01/17/63	effluent in pond	na	na	na	na	na	na	na	na	na	na
01/17/63	effluent in ditch	na	na	na	na	na	na	na	na	na	na

? = copy unreadable
na = not analyzed
Reference = Aerojet, 1983, Exhibit 3, p. 6-41

Table 4. Analytical Results - General Inorganics Leach Bed Pond "B" (LB-2)

Sample Date	Sample Type	pH	CaCO3 (ppm)	CaCO3 (ppm)	Dioxide (ppm)	Hardness (ppm)	Conductance Kx10-6	Turbidity	Sodium Ratio
12/01/56	plating rinse	8	260	216	4	44	620	10	29.9
07/09/57	wash down	7	218	186	37.2	32	533	30	18.7
08/23/57	poss. plating rinse	8.7	1190	256	0	934	7000	10	67.8
12/?/61	?	8	232	162	3	70	525	na	na
12/?/61	tap water	7.5	288	204	12	84	585	15	15.1
12/05/57	?	8	286	174	3.2	112	567	25	8.4
?/?/62	?	7.7	450	370	13.7	80	5670	55	88.6
3/?/62	?	6.8	254	140	45.2	114	587	15	20.6
08/28/58	effluent to pond B	8.2	190	158	1.7	32	420	65	11.2
08/27/58	Pond B waste	8.1	140?	100	1.4	40	500	15	45.7
12/?/62	?	?	?	?	?	?	?	5	6.9
05/21/58	Pond B waste	7.5	210	140	6.2	70	455	10	3.5
05/21/58	effluent to pond B	7.6	340	210	10.5?	130	670	30	2.?
12/09/58	effluent to pond B	?	?	?	3.4	?	456	5	9.5
04/14/59	effluent in pond B	7.2	222	176	22	46	448	20	4.8
?/?/63	?	7.6	na	na	na	na	525	na	na
07/17/59	effluent in pond B	7.4	na	na	na	na	558	na	na
?/?/64	effluent	8.5	206	182	0	24	420	0	13.5
?/?/64	?	8.4	192	176	0	16	404	20	18.3
08/04/59	effluent to pond B	8.3	210	166	0	44	538	5	15.4
08/04/60	effluent in pond B	8.3	180	152	0	28	412	5	14.6
01/26/60	?	7.7	210	182	6.7	28	420	5	13.8
01/26/60	effluent to pond B	7.5	250	188	11.1	62	475	5	12.9
10/18/61	effluent to pond B	8	214	158	29	56	510	5	15.5
10/18/61	effluent in pond B	8	184	144	2.7	40	490	5	35.2
12/15/62	waste water in pond	na	na	na	na	na	na	na	na

**Table 4. Analytical Results - General Inorganics Leach Bed Pond "B" (LB-2)
(continued)**

Sample Date	Sample Type	pH	CaCO3 (ppm)	CaCO3 (ppm)	Dioxide (ppm)	Hardness (ppm)	Conductance Kx10-6	Turbidity	Sodium Ratio
12/15/62	waste water in ditch	na	na	na	na	na	na	na	na
9/25/62	effluent to pond B	8.2	168	156	1.6	12	390	0	23.6
9/25/62	effluent in pond B	8.1	126	154	2.1	0	690	10	68.2
3/12/63	effluent in ditch	na	na	na	na	na	na	na	na
1/17/63	effluent in pond	na	na	na	na	na	na	na	na
1/17/63	effluent in ditch	na	na	na	na	na	na	na	na

? = copy unreadable
na = not analyzed
Reference = Aerojet, 1983, Exhibit 3, p. 6-41

Table 5. Summary of Monthly Reported Discharges
Industrial Waste Sewer System

Discharge Period	Quantity Discharged (gallons)	pH (average)	pH (range)	Operating Time (hours)
April 1952	345100	7.1	na	57.5
May 1952	882000	7.1	na	134.5
June 1952	823200	7	na	126.9
July 1952	550600	7	6.5–7.5	89.4
August 1952	738500	7.2	6.5–8.5	122.7
September 1952	1125200	7.2	6.5–9	193.7
October 1952	1090800	7.4	6.5–9	171.1
November 1952	1083500	7.3	6.5–9	172.1
December 1952	991900	7.2	6.5–8.5	164.5
January 1953	1417200	7	6.5–8.5	225.5
February 1953	1408000	7.1	6.5–8.2	219.2
March 1953	1593900	7.2	6.5–8.5	293.3
April 1953	1715900	7.1	6.5–8.0	285.5
May 1953	1752200	7.1	6.5–8.8	294.6
June 1953	1818100	7.1	6.5–9.0	300.6
July 1953	1791600	7.1	6.5–8.9	293.3
August 1953	1871100	7.2	6.5–8.7	317.7
September 1953	1469200	7.2	6.5–9.0	244
October 1953	1558000	7.3	6.5–9.0	257.2
November 1953	1486500	7.3	6.5–9.4	241.9
December 1953	1763800	7.4	6.5–9.6	288.2
January 1954	1543000	7.3	6.5–9.5	257.7
February 1954	1974000	7.3	6.5–9.4	332.6
March 1954	2553900	7.2	6.6–9.4	428.2
April 1954	2553000	7.2	6.5–9.3	425.5
May 1954	2324300	7.1	6.5–9.3	385.9
June 1954	2753000	7.1	6.5–9.5	481.5
July 1954	2865500	7.1	6.5–9.7	485.7
August 1954	2465000	7.1	6.5–9.5	463.5
September 1954	2601000	7.2	6.5–9.5	448.2
October 1954	2143600	7.2	6.5–9.5	384.4
November 1954	1565100	6.9	6.0–9.4	353.7
December 1954	1795000	6.9	6.0–9.6	391.7
January 1955	1358100	6.9	6.0–9.6	296.1
February 1955	1508600	7	6.0–9.5	362.4
March 1955	1935100	6.9	6.0–9.5	442.2
April 1955	1664300	6.8	6.0–9.5	354.4
May 1955	1631700	6.9	6.0–9.6	356.4
June 1955	62351500	6.8	6.0–9.5	502

na = not available

Table 6. AISA Aerial Photograph Prints Reviewed by HLA

Photo Number	Date	Source	Reference Number
1	1945	EMSL	--
2	October 9, 1947	Aerojet	R1376
3	April 22, 1948	Aerojet	R6472
4	May 1948	Optical Radiation Corp. (1)	R548-6
5	May 1950	Aerojet	R0550-24
6	May 1950	Transit Mixed Concrete Co.	550-26
7	May 1950	Transit Mixed Concrete Co.	550-32
8	February 1951	Transit Mixed Concrete Co.	0251-234
9	February 1951	Transit Mixed Concrete Co.	0251-235
10	February 1951	Transit Mixed Concrete Co.	0251-236
11	February 1951	Transit Mixed Concrete Co.	0251-238
12	February 1951	Transit Mixed Concrete Co.	0251-239
13	August 1951	Aerojet	851-087
14	August 1951	Optical Radiation Corp. (1)	851-091
15	March 1952	Aerojet	352-206
16	September 1952	Aerojet	0952-196
17	October	Aerojet	1052-301
18	June 7, 1954	EMSL	--
19	September 1954	Aerojet	954-203
20	August 1955	Optical Radiation Corp. (1)	855-1391
21	December 1955	Transit Mixed Co.	1255-043
22	December 1955	Aerojet	1255-080
23	December 1957	Aerojet	1257-850
24	August 1959	Aerojet	859-1515
25	August 20, 1959	EMSL	--
26	October 1960	Aerojet	1060-724
27	March 1, 1961	EMSL	--
28	November 1961	Optical Radiation Corp. (1)	1161-927
29	January 1963	Aerojet	163-984
30	December 1963	Aerojet	1263-1190
31	March 1964	Aerojet	CN364-043
32	May 8, 1965	EMSL	--
33	February 1966	Aerojet	266-426

Table 6. AISA Aerial Photograph Prints Reviewed by HLA
(continued)

Photo Number	Date	Source	Reference Number
34	February 1966	Optical Radiation Corp. (1)	266-427
35	February 1966	Optical Radiation Corp. (1)	266-430
36	February 1966 (2)	Optical Radiation Corp. (1)	266-435
37	September 24, 1968	EMSL	--
38	November 1969	Aerojet	1169-312
39	March 3, 1971	EMSL	--
40	February 11, 1972	Transit Mixed Corp. (1)	--
41	October 24, 1975	EMSL	--
42	November 1976	Aerojet	1176-059
43	February 15, 1980	EMSL	--
44	February 1981	Aerojet	CN281-088
45	Janaury 2, 1983	EMSL	--
46	February 14, 1985	EMSL	--
47	April 20, 1987	EMSL	--
48	January 1988	Aerojet	CN188-135-8

(1) Only halftone photocopies were provided by EPA for review.

(2) Labeled December 1965; however, date was assumed based on the reference number.

Table 7. AISA Site Features and Corresponding Aerial Photograph Print Numbers

Feature	Description	Aerial Photograph Print Numbers Where Feature was Observed
B-1	Basin located offsite approximately 300 feet south of the proving grounds as seen in aerial photographs.	3, 15, 17, 18, 23, 24, 25, 26, 27, 30, 31, 32, 33
BA-1	Burn area in a historical gravel pit as seen in aerial photographs (1952-1961).	17, 18, 24, 25, 26, 27
DG-1	Drainage to the south from the old proving grounds to B-1 as seen in aerial photographs.	3, 7, 13, 15, 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39, 41
DG-2	Drainage to the east along the southern boundary of the site towards PL-4 as seen in a 1985 aerial photograph.	46
DG-3	Drainage near the southwest corner of the site as seen in a 1945 aerial photograph.	1, 3
DR-1	Drum storage area from before 1947 to 1967 as identified by Aerojet and seen in aerial photographs (1951) as unpaved. Confirm drums on aerial photographic print Nos. 8, 9, and 10.	2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 27, 32, 33, 34, 35, 36
DR-2	Drum storage area from 1947 to 1970 on a paved area in the northeast corner of the proving grounds.	16
DR-3	Drum storage area from 1947 to 1970 on a paved area in the northeast corner of the proving grounds. Confirm presence of drums on aerial photographic print Nos. 10, 16, and 19.	10, 13, 16, 19, 22, 23
DR-4	Drum storage area during the 1950s, asphalt paved. No visual confirmation of drums on aerial photographs.	16, 18, 21, 22, 23

Table 7. AISA Site Features and Corresponding Aerial Photograph Print Numbers (continued)

Feature	Description	Aerial Photograph Print Numbers Where Feature was Observed
DR-5	Drum storage area during the 1950s, asphalt paved. Confirm presence of drums on aerial photographic print Nos. 11 and 12.	11, 12
DR-6	Drum storage area during the 1950s, asphalt paved. Possible visual confirmation of drums on aerial photographic print Nos. 6 and 14.	5, 6, 7, 13, 14, 16, 17, 19, 20
DR-7	Drum storage area during the 1950s, asphalt paved. Confirm drums on aerial photographic print No. 12.	12, 16
DR-8	Drum storage area in Building 118 in the northeast corner of the site from 1948 to the present, concrete floor. Roofed drum storage structure, thus no visual identification of drums.	2, 3, 4, 5, 6, 7, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 43, 44, 45, 46, 47, 48
DR-9	Drum storage area in Building 142 in the northeast corner of the site from 1948 to 1960, asphalt paved. Possible visual confirmation of drums on aerial photographic print Nos. 3 and 14.	13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25
DR-10	Drum storage area in Building 142 in the southwest portion of the site from 1960 to 1970, asphalt paved. Roofed drum storage structure, thus no visual identification of drums on aerial photographic prints.	24, 25, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39
DR-11	Drum storage area in Building 50 in the eastern portion of the proving grounds from 1950 to 1962, concrete floor. Roofed drum storage structure, thus actual drums are not discernable on aerial photographic prints.	5, 6, 16
DR-12	Drum storage area in Buildings 50 and 96 in the western portion of the proving grounds from 1962 to 1969, concrete floor. Roofed drum storage structure, thus no drums are visual on aerial photographic prints.	29, 30, 32, 33, 34, 35, 37, 39

Table 7. AISA Site Features and Corresponding Aerial Photograph Print Numbers (continued)

Feature	Description	Aerial Photograph Print Numbers Where Feature was Observed
DR-13	Drum storage area in Building 50/96 in the northeast corner of the site from 1969 to the present. Roofed drum storage structure, thus no drums are visual on aerial photographic prints.	39, 41, 42, 43, 44, 45, 46, 47, 48
DR-14	Drum storage area in Building 202 in the northeast corner of the site from 1983 to the present, concrete floor. Roofed drum storage structure, thus no drums are visual on aerial photographic prints.	45, 46, 47
DR-15	Drum storage area in the southwest corner of the site as seen in the 1968 and 1971 aerial photographs. No visual confirmation of drums on aerial photographic prints.	37, 39
DR-16	Drum storage area in the southwest corner of the site as seen in an open storage area in the 1975 and 1980 aerial photographic prints, and on a paved area in the 1983 aerial photographic print. Drums confirmed on aerial photographic print No. 46	45, 46
DR-17	Drum storage area in the southwest corner of the site as seen in 1983 and 1985 aerial photographs, paved. Drums confirmed in both aerial photographic prints.	45, 46
DR-18	Drum storage area in the southwest corner of the site as seen in 1983 and 1985 aerial photographic print, paved. Drums may be discernable in aerial photographic print No. 46	45, 46
DR-19	Possible drum storage area in the northwest portion of the site as seen in 1975 aerial photographic print, unpaved. Drums not discernable in aerial photographic print.	41
DR-20	Possible drum storage area in the northwest portion of the site as seen in 1975 aerial photographic print, unpaved. Drums not discernable in aerial photographic print.	41

Table 7. AISA Site Features and Corresponding Aerial Photograph Print Numbers (continued)

Feature	Description	Aerial Photograph Print Numbers Where Feature was Observed
DR-21	Possible drum storage area in the northwest portion of the site as seen in 1975 aerial photographic prints, unpaved. Drums not discernable in aerial photographic print.	41
DR-22	Possible drum storage in a salvage yard in the northeast corner of the site from 1954 to 1963 and seen in the 1954 aerial photographic print as an open storage area containing drums. Drums not discernable in aerial photographic prints.	18, 22, 23, 24, 25, 26, 27, 29
DR-23	Drum storage in a salvage yard in the southwest portion of the site from 1963 to 1970, unpaved. Drums not discernable in aerial photographic prints.	30, 31, 32, 33, 34, 35, 36, 37, 38
DR-24	Drum storage area in the southwest portion of the site as seen in the 1968 to 1972 aerial photographs, unpaved. Drums not discernable in aerial photographic prints.	37, 38, 39, 40
DR-25	Drum storage area east of Building 322.	*
DR-26	Drum storage area at Ioptex Building.	*
DR-27	Drum storage south of Building 27.	6, 7
LB-1	Leach Bed No. 1 along the southern boundary of the site.	23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 45, 46, 47, 48
LB-2	Leach Bed No. 2 south of the old Special West Area.	7, 13, 15, 17, 18, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42
LB-3	Leach Bed No. 3 at the current location of Building 160.	2, 3, 4, 5, 6, 7, 9, 10, 13, 14, 15, 16, 17, 18, 21, 22

Table 7. AISA Site Features and Corresponding Aerial Photograph Print Numbers (continued)

Feature	Description	Aerial Photograph Print Numbers Where Feature was Observed
LB-4	Leach Bed No. 4 north of LB-2.	30, 31, 32, 33, 34, 35, 36, 37
LP-1	Leach pits near Building 16.	6
LP-2	Leach pit near Building 40.	*
LP-3	Leach pit near Building 56.	*
LP-4	Four leach pits located between Building 118 and 119.	*
LP-5	Eight leach pits located south of Building 59.	*
LP-6	Four leach pits located south of Building 141 and 63.	*
LP-7	Six leach pits between Buildings 17, 63, and 170.	*
PL-1	Ponded liquid area near RC-1 (see below) as seen in aerial photographic prints (1947-1954).	2, 3, 4, 5, 6, 7, 9, 10, 13, 14, 16, 17, 18, 19
PL-2	Ponded liquid south of Building 301 west of the Special West Area as seen in 1954 and 1955 aerial photographic prints.	22, 30, 32, 35
PL-3	Discolored area identified by EPA as ponded liquid area located in the northwest portion of the site as seen in aerial photographic prints (1959-1961).	24, 25, 26, 27
PL-4	Ponded liquid area southeast of the site boundary as seen in a 1985 aerial photograph.	45, 46, 47, 48
PL-5	Ponded liquid south of Building 310 as seen in aerial photographic prints (1950-1955).	7, 17, 21, 22
RC-1a	Ring channel (1a) in the east central portion of the site as seen in aerial photographs and Aerojet drawings.	1, 2, 3, 4, 5, 6, 7, 9, 10, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27, 29, 31, 32, 33, 34

Table 7. AISA Site Features and Corresponding Aerial Photograph Print Numbers (continued)

Feature	Description	Aerial Photograph Print Numbers Where Feature was Observed
RC-1b	Ring channel (1b) in the east central portion of the site as seen in aerial photographs and Aerojet drawings.	1, 2, 3, 4, 7, 8, 9, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38
SL-1	Stain and liquid area in the southeast portion of the old proving grounds as seen in aerial photographic prints.	1, 2, 3, 4, 5, 6, 7, 13, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 39
SL-2	Stain and liquid area originating from Buildings 110, 119, and 134 and accumulating near former Buildings 1, 2, and 3 as seen in aerial photographic prints (1947-1959).	2, 3, 4, 5, 6, 7, 13, 14, 16, 23, 24
SL-3	Stain and liquid area emanating from Buildings 116 and/or 117 as seen in aerial photographic prints (1947-1959).	2, 3, 5, 6, 7, 13, 16, 17, 18, 24, 25
SL-4	Stain and liquid area in the northwest portion of the site as seen in aerial photographic prints (1961-1971).	23, 24, 25, 26, 27, 28, 32, 33, 34, 35, 36, 37, 39
SL-5	Stain and liquid area in the southwest corner of the site from Building 189 as seen in aerial photographic prints (1968-1983).	37, 39, 41, 43, 45, 46
SL-6	Stain and liquid area from Building 159 as seen in a 1975 aerial photographic print.	41
S-1	Sump used by the Optical Radiation Corp. from 1972 to 1977.	*
T-1a	Above ground fuel oil storage tank (5,000 gallon) near Building 136.	2, 4, 5, 6, 7, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 29, 30, 32, 33, 34, 35, 36

Table 7. AISA Site Features and Corresponding Aerial Photograph Print Numbers (continued)

Feature	Description	Aerial Photograph Print Numbers Where Feature was Observed
T-1b	Above ground TCE storage tank (5,000 gallon) near Building 136. Tank was never used.	23, 24, 25, 26, 27, 29, 30, 32, 33, 34, 35
T-2	Underground 1,000-gallon storage tank for liquid wastes from the laboratory in Building 200.	*
T-3	Liquid waste storage tank on the north side of Building 53.	*
T-4	Underground 1000-gallon storage tank for gasoline located southwest of Building 136.	*
T-5	Underground 10,000-gallon storage tank for gasoline located north of Building 322.	*
T-6	Underground 280-gallon storage tank for "fresh-oil" located north of Building 322.	*
T-7	Underground 550-gallon storage tank for "used-oil" located north of Building 322.	*
T-8	Underground 6,000-gallon storage tank for gasoline located north west of Building 163.	*
WD-1	Possible waste disposal area in the north central portion of the site as seen in a 1945 aerial photograph.	1
WD-2	Possible waste disposal area in the northeast corner of the site as seen in a 1954 aerial photograph.	1,2,3,4,5,7,13,14,16, 17,18
WD-3	Possible waste disposal area in a historical gravel pit as seen in a 1954 aerial photograph.	2,5,7,17,18,23,24,25, 26,27,31,32,33
WD-4	Possible waste disposal area in the western portion of the site as seen in a 1954 aerial photograph.	13,15,17,18
WT-1	Historical industrial waste treatment facility in the central portion of the site as seen in aerial photographs (1952-1971).	15, 17, 18, 22, 23, 24, 25, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 39

Table 7. AISA Site Features and Corresponding Aerial Photograph Print Numbers (continued)

Feature	Description	Aerial Photograph Print Numbers Where Feature was Observed
WT-2	Current industrial waste treatment facility in Building 164 (1972-present).	40, 41, 42, 43, 45, 46, 47, 48
Metzner Automobile Wrecking Yard	Junk yard located in Western AISA.	30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41
Metzner Go-Cart Raceway	Racetrack and associated buildings.	24, 25, 26, 27, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41

Note: * = Not identified in aerial photograps.

Degreaser and PCB transformer locations not identified in the aerial photographic print review.

Table 8a. Summary of Potential Source Areas/Areas of Interest

Feature	Feature Identification	General Location within AISA	Building	Size of Feature (in feet)	Period of Use Start	Period of Use End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
Degreaser	DE-1a	North	136	4 x 10 x 7	195(?)	1968	TCE		1 SZB
	DE-1b	Northeast	57	4 x 10 x 7	195(?)	1968	TCE		1 SZB
	DE-2	Northeast	57	9 x 3 x 4	195(?)	1971	TCE		--
	DE-3	Northeast	57	3 x 3 x 4	195(?)	1971	PCE		--
	DE-4	Central	116/117	2 x 2 x 2	194(?)	1956	TCE		1 SZB
	DE-5	West	159	3 x 5.5 x 5	1958	1971	TCE	Transferred 1971 to Aerojet Investment Ltd.	--
	DE-6	North	136	6 x 12 x 10	194(?)	1968	TCE		1 IZB
	DE-7	North	53A	3 x 4 x 6	195(?)	1968	TCE		--
	DE-8	North	136	4.5 x 3 x 6	1952	1969	TCE		--
	DE-9	West	112	5 x 1.5 x 3	1976	1983	TF Freon	In storage	--

Note: Some borings/wells are located within two overlapping source areas, but are only listed above in one area.

SZB = Shallow zone soil boring.
IZB = Intermediate zone soil boring.
DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8a. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Building	Size of Feature (in feet)	Period of Use Start	Period of Use End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
Degreaser	DE-10	Central	194	3 x 1.5 x 3	1976	1985	Lonco 113		--
	DE-11	Central	194	2.5 x 2.5 x 3.5	1976	Present	Lonco 113		--
	DE-12	Central	53A	4 x 2 x 2	1976	1991	1,1,1-TCA		--
	DE-13	North	168	4 x 2 x 3	1976	1988	Lonco 113		--
	DE-14	Central	183	1.5 x 5 x 3	1976	1982	Lonco 113	In storage	--
	DE-15	Central	194	2.5 x 2.5 x 3.5	1982	1982	Lonco 113		--
	DE-16	Central	194	2.5 x 2.5 x 3.5	1983	Present	Lonco 113		--
	DE-17	Central	194	2 x 2 x 3	1983	Present	Lonco 113		--

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SZB = Shallow zone soil boring.
IZB = Intermediate zone soil boring.
DZB/Monitoring Well = Deep zone zoil boring/groundwater monitoring well.

Table 8b. Summary of Potential Source Areas/Areas of Interest

Feature	Feature Identification	General Location within AISA	Specific Location	Period of Use Start	Period of Use End	Proposed AISA Site Assessment Field Activities
Drum Storage	DR-1	Central	Northern End of Former Building No. 200	Prior to 1947	1967	1 IZB
	DR-2	Southeast	South of Former Building No. 183	Prior to 1947	1970	1 SZB
	DR-3	Southeast	Adjacent to Former Building No. 180	Prior to 1947	1970	1 SZB
	DR-4	South	East of Former Building No. 114	1952	1953	1 SZB
	DR-5	Central	East of Former Building No. 84	1941	1971	1 SZB
	DR-6	North	East of Former Building No. 305	1952	1957	1 SZB
	DR-7	Central	East of Existing Building No. 159	1952	1956	1 SZB
	DR-7	Central	West of Former Building No. 84	1952	1956	1 SZB
	DR-8	North	Building No. 118	1948	After 1988	1 SZB
	DR-9	Northeast	Former Building No. 142	1948	1960	1 SZB

Note: Some borings/wells are located within two overlapping source areas, but are only listed above in one area.

SZB = Shallow zone soil boring.
IZB = Intermediate zone soil boring.
DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8b. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Period of Use Start	Period of Use End	Proposed AISA Site Assessment Field Activities
Drum Storage	DR-10	South	Former Building No. 142	1960	1970	1 SZB
	DR-11	South	Former Building No. 50	1950	1962	1 SZB
	DR-12	South	Former Building Nos. 50 and 96	1962	1969	2 SZBs (one SZB at Former Bldg. No. 50 and one SZB at Former Bldg. No. 96)
	DR-13	Northeast	Existing Building Nos. 50 and 96	1969	Present	2 SZBS (one SZB of Existing Bldg. No 50 and one SZB at Former Bldg. No. 96)
	DR-14	Northeast	Existing Building No. 202	1983	Present	--
	DR-15	Southwest	West of the Special West Area	NA	NA	2 SZBs
	DR-16	Southwest	East of Reichhold Chemical Bldg.	1975	1980	2 SZBS
	DR-17	Southwest	West and South of Reichhold Chemical Bldg.	1983	Present	3 SZBs

Note: Some borings/wells are located within two overlapping source areas, but are only listed above in one area.

SZB = Shallow zone soil boring.
IZB = Intermediate zone soil boring.
DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8b. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Period of Use Start	Period of Use End	Proposed AISA Site Assessment Field Activities
Drum Storage	DR-18	West	North of existing Building No. 190	1983	Present	1 SZB
	DR-19	Northwest	In former Metzner Property	NA	NA	1 SZB
	DR-20	Northwest	In former Metzner Property	NA	NA	1 SZB
	DR-21	Northwest	In former Metzner Property	NA	NA	2 SZBs
	DR-22	Northeast	North of existing Building No. 178	1954	1963	1 SZB and 1 DZB/Monitoring Well
	DR-23	Southwest	Salvage Yard	1963	1970	2 SZBs
	DR-24	Southwest	West of Special West Area	NA	NA	2 SZBs
	DR-25a-d	Central and South	4 Locations adjacent to Former Buildings 53, 146, 183, and 194)	1983	1988-1991	--
	DR-26	North	Former Ioptex Building	Post-1976	1990	1 SZB
	DR-27	Central	Adjacent to Building Nos. 27 and 28	Prior to 1950	1960	1 SZB

Note: Some borings/wells are located within two overlapping source areas, but are only listed above in one area.
NA = Not available.
SZB = Shallow zone soil boring.
IZB = Intermediate zone soil boring.
DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8c. Summary of Potential Source Areas/Areas of Interest

Feature	Feature Identification	General Location within AISA	Specific Location	Approximate Period of Use Start	Approximate Period of Use End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
Industrial Waste Treatment Locations	WT-1	South/Southwest	West of Former Bldg. No. 185	1952	1971	Industrial waste water, proving grounds water discharge, rainwater runoff		1 IZB
	WT-2	South	South of Former Bldg. No. 322	1971	Present	Industrial waste water, proving ground water discharge, rainwater runoff		1 IZB
Ponded Liquid	PL-1	Central	West of Former Bldg. No. 65	1955	1966	Not Known	Probably discharge associated with swamp cooler, rainwater runoff, and ring channel discharge	1 IZB
	PL-2	Southwest	Southwest of Former Bldg. No. 301	1955	1966	Discharge from former Bldg. Nos. 301 and 318	Probably discharge associated with Bldg. Nos. 301 and 318 (Test and Alclo Lab buildings).	1 SZB
	PL-3	West	Along Western Railroad Tracks	1959	1961	Fertilizer/Agricultural Products	Feature identified by EPA is associated with fertilizer/agricultural products	–

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SZB = Shallow zone soil boring.
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DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8c. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Approximate Period of Use Start	Approximate Period of Use End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
	PL-4	Southeast	Southeast Corner of AISA	1983	Present	Rainfall runoff	Collection point for rainfall runoff from Aerojet's southeast parking lots	--
	PL-5	South	South of Former Bldg. No. 310	1950	1955	Not Known	Adjacent to industrial waste treatment facility	2 SZBs
Leach Beds	LB-1	South	South of the Proving Grounds	1957	Present	"Once Through" cooling water, rainwater runoff, some cooling tower bleed-off water	Water samples from LB-1 analyzed by the engineers from the County of Los Angeles	1 SZB; 1 IZB; 1 DZB/ Monitoring Well
	LB-2	Southwest	South of Special West Area	1950	1980	Surface water runoff, cooling tower and other cooling water	2 locations, water in LB-2 sampled by the engineers from the County of Los Angeles	2 SZBs, 1 IZB, 1 DZB/ Monitoring Well
	LB-3	East	Southeast of Ring Channel Area	1947	1957	Surface water runoff, cooling tower and other cooling water, ring channel water discharge		1 SZB, 1 IZB
	LB-4	West	North of Former Bldg. No. 325 and 301	1963	1970	Waste water from scrubbing activities at Bldg. 325	Scrubbing activities of atmospheric vents at former Bldg. No. 325 was the source of waste water.	1 SZB; 1 IZB

Note: Some borings/wells are located within two overlapping source areas, but are only listed above in one area.
SZB = Shallow zone soil boring.
IZB = Intermediate zone soil boring.
DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8c. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Approximate Period of Use Start	Approximate Period of Use End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
Sump	S-1	West	South of Existing ORC Bldg. No. 159	1972	1977	Organics, metals (Ni, Cr, Cu)	Currently owned by Optical Radiation Corp.	1 SZB
Tank	T-1a	North	West of Former Bldg. No. 136	Prior to 1947	1966	Fuel Oil Only	5,000 gallon capacity	1 SZB
	T-1b	North	West of Former Bldg. No. 136	1957	1966	Not Used	5,000 gallon capacity	1 SZB
Tank	T-2	Central	Bldg. No. 200	1968	1982	Rinse Water	1,000 gallon capacity	1 SZB
	T-3	North	Bldg. No. 53A	1972	1986	Laboratory Wastes	1,250 gallon capacity	1 SZB
	T-4	North	West of Former Bldg. No. 136	(?)	1959	Gasoline	1,000 gallon capacity task replaced by a 10,000 gallon tank in 1959	1 SZB
	T-5	Central	North of Existing Bldg. No. 322	1959	Present	Gasoline	In 1971 the 10,000 gallon tank (T-4) was relocated from Bldg. No. 136 to Bldg. No. 322	1 SZB
	T-6	Central	North of Existing Bldg. No. 322	1971	1985	Fresh motor oil	280 gallon capacity	–

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DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8c. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Approximate Period of Use Start	End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
	T-7	Central	North of Existing Bldg. No. 322	1971	1985	Used motor oil	550 gallon capacity	–
	T-8	West	West of Existing Bldg. No. 163	1979	Present	Gasoline	6,000 gallon capacity closure attained	–
Waste Disposal Area	WD-1	North	West of Existing Bldg. No. 119	Prior to 1945	1947	Rocket motor testing	Historically area used for rocket testing (Prior to 1945 through 1947)	1 SZB
	WD-2	Northeast	Northeast of Existing Bldg. No. 178	Not Known to Have Been Used			Feature identified by EPA is associated with weather monitoring and vehicle parking activities	–
	WD-3	Northwest	South of Burn Area	Not Known to Have Been Used			Feature identified by EPA is a bush	–
	WD-4	Former Metzner Area	West of Existing Bldg. No. 159	1951	1954	Fertilizer/ agricultural products	Feature identified as fertilizer and agricultural products	–

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DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8c. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Approximate Period of Use Start	End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
Burn Area	BA-1	Northwest	Former Kincaid Pit	1947	1965	Solid propellant waste burning	Pit area also used by Dameral-Allison Company to dispose of citrus waste	3 SZBs, 1 IZB
Ring Channel	RC-1a	East	South of Existing Bldg. No. 199	Prior to 1945	1966-1968	Water	Ring channel used for testing testing hydrodynamics of various designed shapes	–
	RC-1b	East	East of Existing Bldg. No. 199	1947	1971-1975	Water	Ring channel used for testing hydrodynamics of various designed shapes	–
Stain and Liquid Area	SL-1	South	Proving Grounds	Prior to 1945	1968	Rainfall runoff, rocket motor test discharges, industrial waste water	SL-1 historically received industrial waste water (until 1952) rainfall runoff, and rocket motor test discharge	2 SZBs, and 2 IZBs
	SL-2	North	Along Optical Drive	1947	1959	Water from swamp coolers	Aerial photographic prints show that SL-2 is a resultant of swamp cooler water drainage	–
	SL-3	Central	South of Former Bldg. No. 116/117	1947	1959	Water from swamp coolers	Aerial photographic prints show that SL-3 is a resultant of swamp cooler water drainage	–

Note. Some borings/wells are located within two overlapping source areas, but are only listed above in one area.
SZB = Shallow zone soil boring.
IZB = Intermediate zone soil boring.
DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8c. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Approximate Period of Use Start	End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
	SL-4	West	Former Metzner Area	1957	1971	Fertilizer/ agricultural products	Feature identified by EPA is associated with fertilizer/ agricultural product	–
	SL-5	Southwest	East of Riechhold Chemicals, Inc. Buildings	1968	1985	Various Chemicals	Feature observed on aerial photographs east of Riechhold Chemicals, Inc.	1 SZB, 1 IZB
	SL-6	Central	Southeast of Existing ORC Bldg. No. 159	1975	1975	Unknown	Staining originating from southeast corner of ORC Bldg. No. 159	1 SZB
Leach Pits	LP-1	Central	West of Bldg. No. 16	1947	Prior to 1971	Inorganic wastes including: acids, bases, potassium chlorate, and alkali metals	Inorganic waste water from former Building Nos. 16 and B-82	1 DZB/Monitoring Well
	LP-2	Central	South of Ring Channel	1947	Prior to 1970	Inorganic wastes including: acids, bases, potassium Chlorate, and alkali metals	Inorganic waste water from former Building No. 40	1 IZB
	LP-3	East	South of Former Bldg No. 56	Never	Built	Never built or used	Leach pit not built or used	1 IZB
	LP-4	North	Between Bldg. Nos. 118 and 119	1947	1956	Domestic wastes	Septic tank and leach pit system for domestic waste	–

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DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8c. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Approximate Period of Use Start	End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
	LP-5	East	South of Existing Bldg. No. 59	1952	1957	Domestic wastes	Septic tank and leach pit system for domestic waste	–
	LP-6	Central	South of Existing Bldg. No. 144 and Former Bldg. 63	1947 and 1951	1957	Domestic wastes	Septic tank and leach pit system for domestic waste from the Cafeteria (Bldg. No. 141) and the Machine Tool Repair Bldg. (Bldg. No. 63)	1 SZB
	LP-7	Central	Between Bldg. Nos. 7, 53, 109 and 110	1948 and 195 (?)	1957	Domestic wastes	Septic tank and leach pit system for domestic water	1 SZB
Drainage Channels	DG-1	South	Proving Grounds	1948	1975	Rainfall runoff, rocket motor test discharges, industrial waste water, cooling water	Drainage channel DG-1 not used other than for rainfall runoff after 1952	4 Near - Surface Sediment Samples
	DG-2	Southeast	South of Aerojet's Southeastern Parking Lot	1985	Present	Rainfall runoff from Aerojet's southeast parking lot	–	–
	DG-3	Southwest	South of Riechhold Chemicals, Inc. Bldgs.	Prior to 1945	1948	Rainfall runoff from alluvial fan	Natural surface water drainage swale along alluvial fan	4 Near-surface sediment samples

Note: Some borings/wells are located within two overlapping source areas, but are only listed above in one area.
SZB = Shallow zone soil boring.
IZB = Intermediate zone soil boring.
DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8c. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Approximate Period of Use Start	Approximate Period of Use End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
Basin	B-1	South	South of Proving Grounds	1948	1957	Rainfall runoff, rocket motor test discharges, industrial waste water, cooling water	Discharge to Basin B-1 not used other than for rainfall runoff after 1952. B-1 is visible as vegetation remnants only after 1957. B-1 has been excavated.	--
Transformers	TP-1	West	Bldg. No. 59	Prior to 1982	Present	Transformer fluid containing PCBs	PCB containing fluid removed from transformer in 1982	1 Near-surface sediment sample
	TP-2	West	Bldg. No. 160	Prior to 1982	Present	Transformer fluid containing PCBs	PCB containing fluid removed from transformer in 1982	1 Near-surface sediment
	TP-3	West	Bldg. No. 160A	Prior to 1982	Present	Transformer fluid containing PCBs	PCB containing fluid removed from transformer in 1982	1 Near-surface sediment sample
	TP-4	Central	Bldg No. 170	Prior to 1982	Present	Transformer fluid containing PCBs	PCB containing fluid removed from transformer in 1982	1 Near-surface sediment sample
	TP-5	Central	South of Bldg. No. 179	Prior to 1982	Present	Transformer fluid containing PCBs	PCB containing fluid removed from transformer in 1982	1 Near-surface sediment sample
	TP-6	Central	West of Bldg. No. 183	Prior to 1982	Present	Transformer fluid containing PCBs	PCB containing fluid removed from transformer in 1982	1 Near-surface sediment sample
	TP-7	Central	Bldg. No. 200	Prior to 1982	Present	Transformer fluid containing PCBs	PCB containing fluid removed from transformer in 1982	1 Near-surface sediment sample

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IZB = Intermediate zone soil boring.
DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 8c. Summary of Potential Source Areas/Areas of Interest (continued)

Feature	Feature Identification	General Location within AISA	Specific Location	Approximate Period of Use Start	End	Materials	Miscellaneous	Proposed AISA Site Assessment Field Activities
Metzner Area Automobile Wrecking Yard	Wrecking Yard	West	East of the western railroad tracks	1963	1975	Oils(?), Fuels(?), Solvents(?)	Waste handling practices in the wrecking yard unknown	2 SZBs; 1 IZB
Metzner Area Go-Cart Raceway	Go-Cart Buildings	Northwest	West of the western railroad tracks	1959	1975	Fuels(?), Solvents(?)	Waste handling practices in the wrecking yard unknown	2 SZBs
Background/ Upgradient Monitoring Well	MW-5	North	Former Kincaid	--	--	Not Applicable		1 DZB/Monitoring Well

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SZB = Shallow zone soil boring.
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DZB/Monitoring Well = Deep zone soil boring/groundwater monitoring well.

Table 9. Well Construction Data

Well Owner's Name	ID Number (TDM Location)	Owner Number	Top of Casing Elevation (feet msl)	Total Depth of Well (feet)	First Screened Interval	Second Screened Interval
Valley County Water District	01900029	3 Morada		199	112 - 121	172 - 175
Valley County Water District	01900034	8 Arrow Highway	456.0	540	300 - 524	
Burbank Development Company	01900093	Burbank				
Manning Brothers	01900117	36230	452.0	310	200 - 305	
California American Water - Duarte	01900354	Santa Fe	513.1	600	235 - 512	524 - 598
California American Water - Duarte	01900357	Los Lomas	591.4	297	90 - 270	
California American Water - Duarte	01900358	Fish Canyon	708.2	192	75 - 120	
Glendora, City of	01900827	12G	681.0	250	59 - 236	
Glendora, City of	01900829	8E	681.1	255	129 - 204	
Glendora, City of	01900830	9E	681.1	250	96 - 225	
Glendora, City of	01900831	7G	528.8	500	252 - 474	
Covina Irrigating Company	01900881	Contract	496.0	485		
Livingston-Graham, Inc.	01900963	1 Kin	549.7	450	315 - 430	
Glendora, City of	01901524	4E	472.1	370	205 - 370	
Glendora, City of	01901525	3G	472.1	500	186 - 476	
Azusa Valley Water Company	01902115	4	647.8	298		
Azusa Valley Water Company	01902116	5	644.9	282	120 - 282	
Azusa Valley Water Company	01902117	6	507.0	660	280 - 660	
Azusa Valley Water Company	01902425	7	502.0	980	787 - 980	
Azusa Agriculture Water Co.	01902457	2		250		
Azusa, City of	01902458	2 South	695.0	243	133 - 243	
Azusa, City of	01902533	1	668.9	288		
Azusa, City of	01902535	3		288	90 - 206	
Azusa, City of	01902536	4		590	275 - 568	
Azusa, City of	01902537	5	560.0	655	350 - 638	
Azusa, City of	01902538	6	520.2	676	396 - 654	
California American Water - Duarte	01902907	Wiley				
California American Water - Duarte	01903018	Crown Haven	576.7	600	350 - 580	
Conrock Co. (also CA Portland Cement)	01903088	1-Rel	550.0	550	350 - 440	450 - 535
Owl Rock Products Company	01903119			200	80 - 206	
Miller Brewing Company	08000034		625.5	300	150 - 284	
Valley County Water District	08000060	10 Lante	451.5	600	300 - 600	
Los Angeles, County of	08000070	1 Santa Fe		451	290 - 435	
Azusa, City of	08000072	7		400	115 - 400	
Miller Brewing Company	08000075	1				
Miller Brewing Company	08000076	2		1005	515 - 975	
Azusa, City of	08000086	8		440	150 - 340	
Az-Two, Inc. (also Transit Mix #2)	11900038	2		630	350 - 614	
California American Water - Duarte	11900497	Bacon	631.9	226		

Table 9. Well Construction Data
(continued)

Well Owner's Name	ID Number (TDM Location)	Owner Number	Top of Casing Elevation (feet msl)	Total Depth of Well (feet)	First Screened Interval	Second Screened Interval
Azusa Land Reclamation	W11AZW03	MW-3		385	180 - 385	
Azusa Land Reclamation		MW-4				
Azusa Land Reclamation		MW-5				
Azusa Land Reclamation		MW-6				
Azusa Land Reclamation		MW-8				
Azusa Land Reclamation		MW-9				
American Cyanamid Co.		MW-1	635.5	166	155 - 167	
California Amforge Corp.		MW-1	615.8	140	100 - 140	
The Norac Co.		MW-1				
The Valspar Corp.		MW-1		145	105-145	
The Valspar Corp.		MW-2		132	87-132	
The Valspar Corp.		MW-3		132	92-132	

Table modified from: CH2M Hill, 1990. Appendix A, Draft Statement of Work, Irwindale-Azusa Study Area, San Gabriel Areas 1-4, Los Angeles County, California. July.

Table 10. Summary of Proposed AISA Site Assessment Field Activities

Field Activity	Locations Proposed for Investigation	Proposed No. of Sampling Locations
Soil Gas Characterization Program (Refer to Section 2.2 for details.)	Potential Source Areas Limited Data Areas	Approx. 675: 20- to 30-foot Grid Spacing Approx. 250: Nominal 100-foot Grid Spacing
Near-Surface Sediment Sampling Program (Refer to Section 2.3 for details)	Drainage Courses DG-1, DG-3, and Transformer Locations TP-1 through TP-7	15
Shallow Zone Soil Borings (Refer to Section 2.4.1 for details)	DE-1a, DE-1b, DE-4, DR-2 through DR-13, DR-15 through DR-24, DR-26, DR-27, S-1, T-1a, T-1b, T-2 through T-5, WD-1, BA-1, SL-1, SL-5, SL-6, PL-1, PL-2, PL-5, LB-1 through LB-4, LP-6, LP-7, and E.K. Metzner Automobile Wrecking Yard and Go-Cart Raceway	66
Intermediate Zone Soil Borings (Refer to Section 2.4.2 for details)	LB-1, LB-2, LB-3, LB-4, LP-2, LP-3, BA-1, DR-1, SL-1 (two locations), SL-5, PL-1, DE-6, WT-1, WT-2, and E.K. Metzner Wrecking Yard	16
Deep Zone Soil Borings (Refer to Section 2.5.1 for details)	LB-1, LB-2, LP-1, and 2 locations along northern boundary of AISA for "background"	5
Groundwater Monitoring Well Installation (Refer to Section 2.5.2 for details)	LB-1, LB-2, LP-1, and 2 locations along northern boundary of AISA for "upgradient"	5

Table 11. Summary of Proposed Analytical Program for AISA Site Assessment

Potential Source Area	8010* Volatile Halogenated Organics	8020* Volatile Aromatic Organics	8270 Semi-Volatile Organics	6010 Full Suite Metals	Ion Chroma-tography Chlorate	9012 Cyanide	8015(m) TPH	8280 Dioxins/ Furans	8080 PCBs
	Analytical Test Method								
DE-1a	X			X		X			
DE-1b	X			X		X			
DE-4	X			X		X			
DE-6	X			X		X			
DR-1	X	X	X	X		X			
DR-2	X	X	X	X	X	X			
DR-3	X	X	X	X	X	X			
DR-4	X	X	X	X		X			
DR-5	X	X	X	X		X			
DR-6	X	X	X	X		X			
DR-7	X	X	X	X		X			
DR-8	X	X	X	X		X			
DR-9	X	X	X	X		X			
DR-10	X	X	X	X		X			
DR-11	X	X	X	X	X	X			
DR-12	X	X	X	X	X	X			
DR-13	X	X	X	X		X			
DR-15	X	X	X	X		X			
DR-16	X	X	X	X		X			
DR-17	X	X	X	X		X			
DR-18	X	X	X	X		X			
DR-19	X	X	X	X		X			
DR-20	X	X	X	X		X			
DR-21	X	X	X	X		X			
DR-22	X	X	X	X		X			
DR-23	X	X	X	X		X			
DR-24	X	X	X	X		X			
DR-26	X	X	X	X		X			
DR-27	X	X	X	X		X			

Note: * 8240 (or an analagous GCMS Method) can be substituted for these combined test methods.

Table 11. Summary of Proposed Analytical Program for AISA Site Assessment (continued)

Potential Source Area	8010* Volatile Halogenated Organics	8020* Volatile Aromatic Organics	8270 Semi-Volatile Organics	6010 Full Suite Metals	Ion Chromatography Chlorate	9012 Cyanide	8015(m) TPH	8280 Dioxins/ Furans	8080 PCBs
	Analytical Test Method								
S-1	X	X	X	X		X			
T-1a		X		X (Pb only)		X	X		
T-1b	X			X		X			
T-2	X	X	X	X		X			
T-3	X	X	X	X		X			
T-4		X		X(Pb only)			X		
T-5		X		X(Pb only)			X		
WD-1	X	X	X	X	X	X		X	
BA-1	X	X	X	X	X	X		X	
SL-1	X	X	X	X	X	X		X	
SL-5	X	X	X	X		X			
SL-6	X	X	X	X		X			
WT-1	X	X	X	X	X	X			
WT-2	X	X	X	X	X	X			
PL-1	X	X	X	X		X			
PL-2	X	X	X	X	X	X			
PL-5	X	X	X	X	X	X		X	
LB-1	X	X	X	X	X	X			
LB-2	X	X	X	X	X	X			
LB-3	X	X	X	X		X			
LB-4	X	X	X	X	X	X			

Note: * 8240 (or an analagous GCMS Method) can be substituted for these combined test methods.

Table 11. Summary of Proposed Analytical Program for AISA Site Assessment (continued)

	Analytical Test Method								
Potential Source Area	8010* Volatile Halogenated Organics	8020* Volatile Aromatic Organics	8270 Semi-Volatile Organics	6010 Full Suite Metals	Ion Chroma-tography Chlorate	9012 Cyanide	8015(m) TPH	8280 Dioxins/ Furans	8080 PCBs
LP-1	X	X	X	X		X			
LP-2	X	X	X	X		X			
LP-6	X	X	X	X		X			
LP-7	X	X	X	X		X			
DG-1	X	X	X	X	X	X		X	
DG-3	X	X	X	X	X	X			
TP-1									X
TP-2									X
TP-3									X
TP-4									X
TP-5									X
TP-6									X
TP-7									X
Metzner Wrecking Yard	X	X	X	X		X			
Metzner Go-Cart Raceway	X	X		X		X			

Note: * 8240 (or an analagous GCMS Method) can be substituted for these combined test methods.

ILLUSTRATIONS

ILLUSTRATIONS

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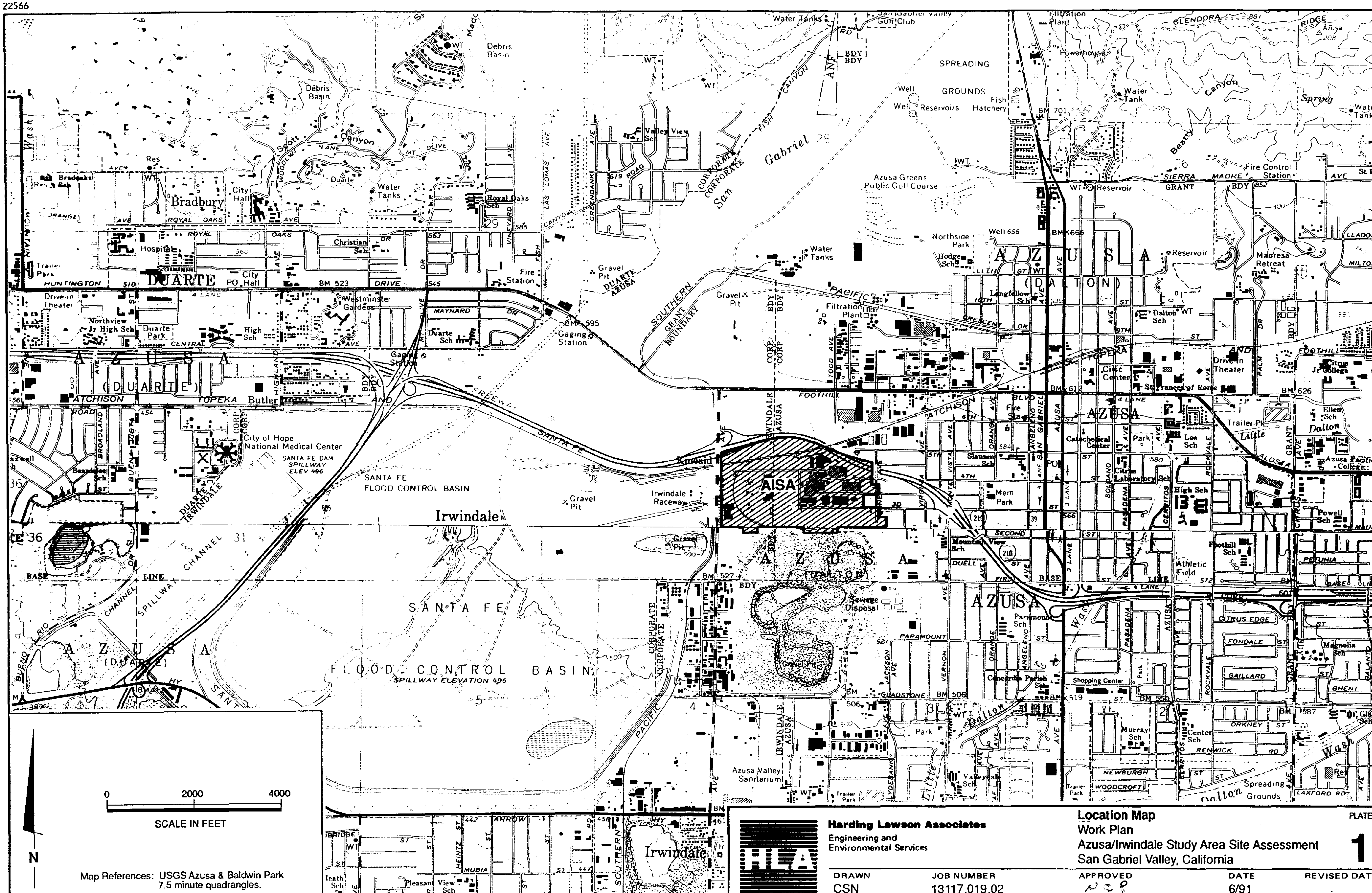

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Map References: USGS Azusa & Baldwin Park 7.5 minute quadrangles.

Harding Lawson Associates

Engineering and Environmental Services

HLA

Location Map

Work Plan

Azusa/Irwindale Study Area Site Assessment

San Gabriel Valley, California

PLATE

1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
CSN	13117,019.02		6/91	

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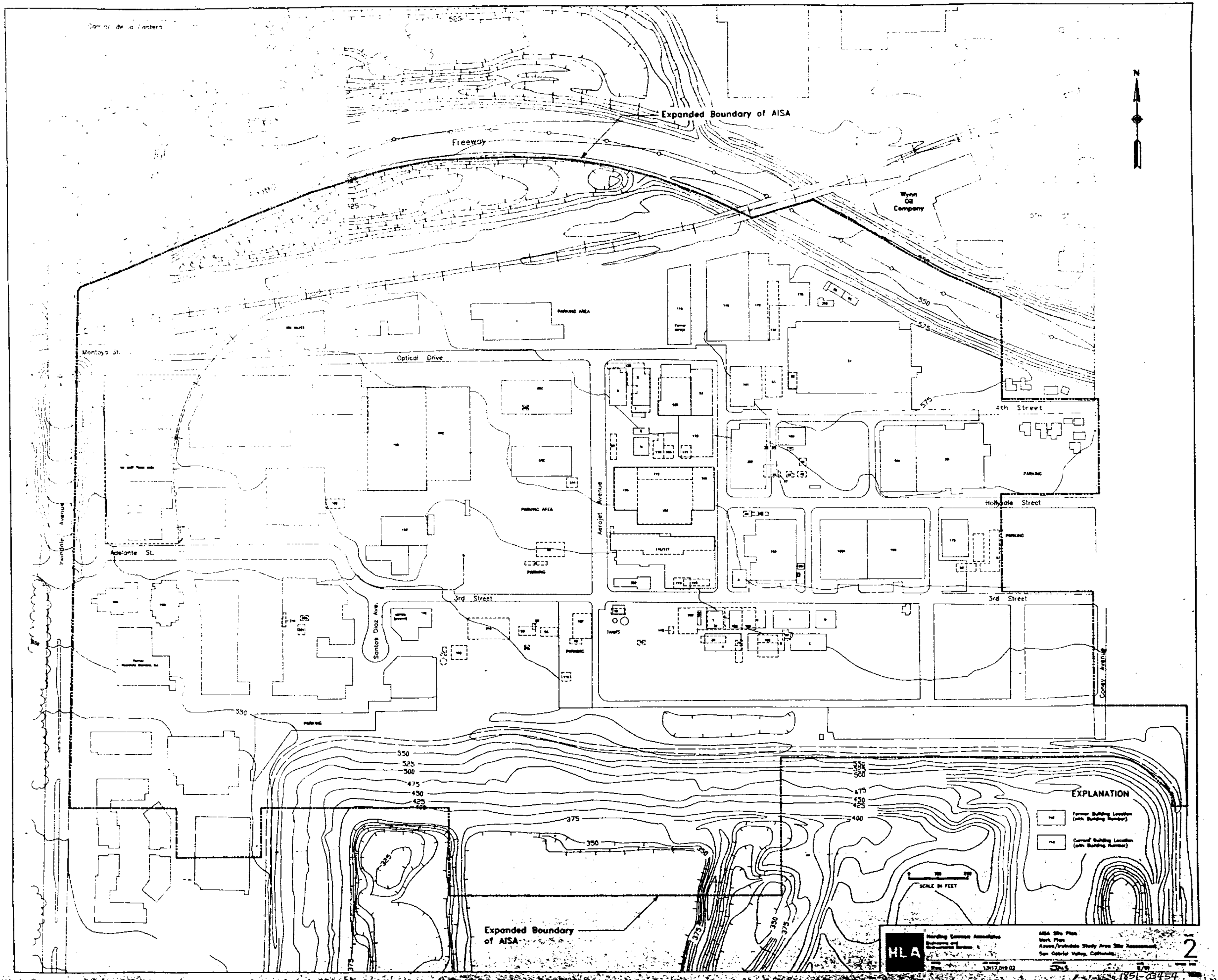

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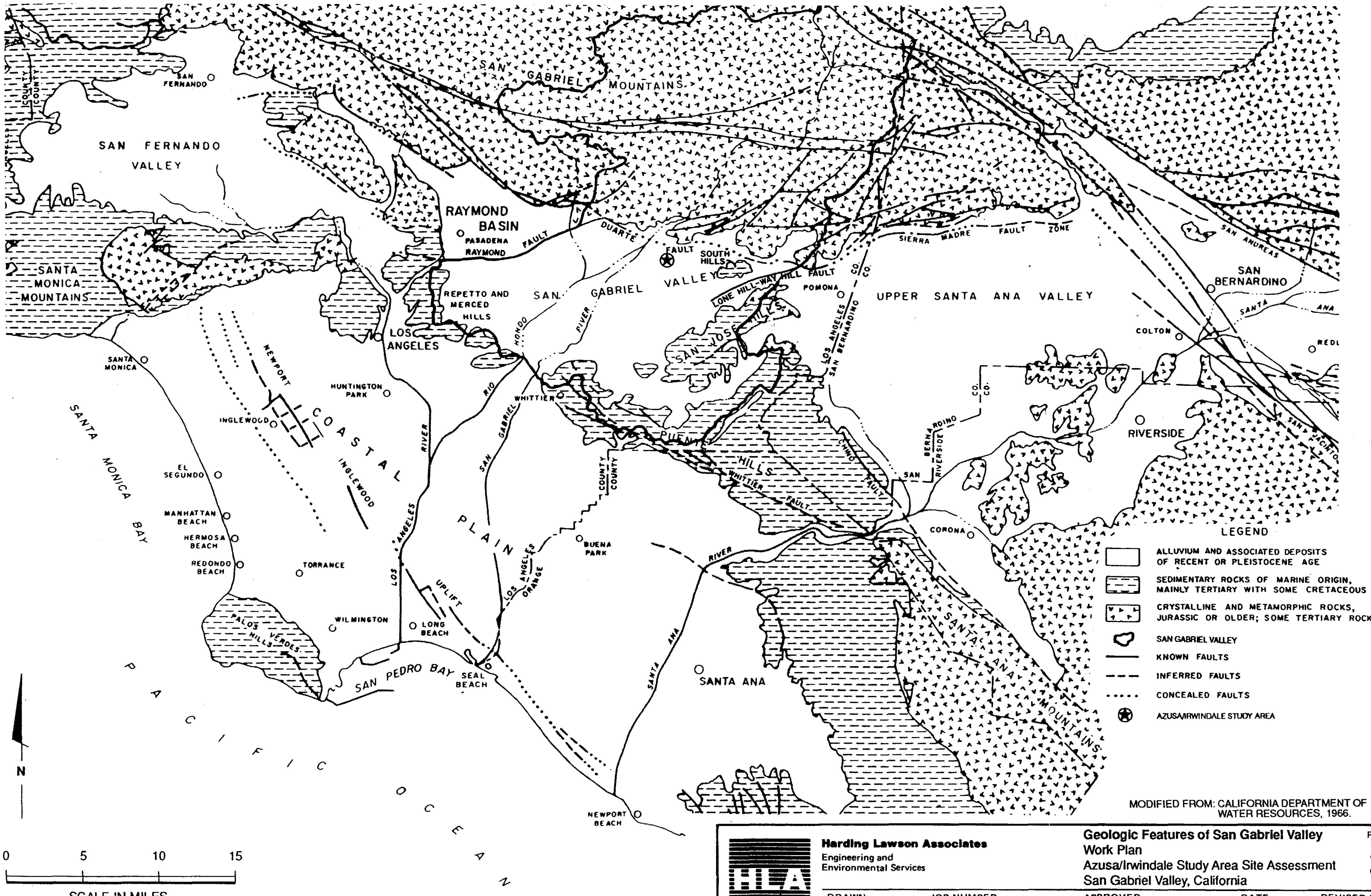

Harding Lawson Associates
Engineering and Environmental Services

Geologic Features of San Gabriel Valley
Work Plan
Azusa/Irwindale Study Area Site Assessment
San Gabriel Valley, California

PLATE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
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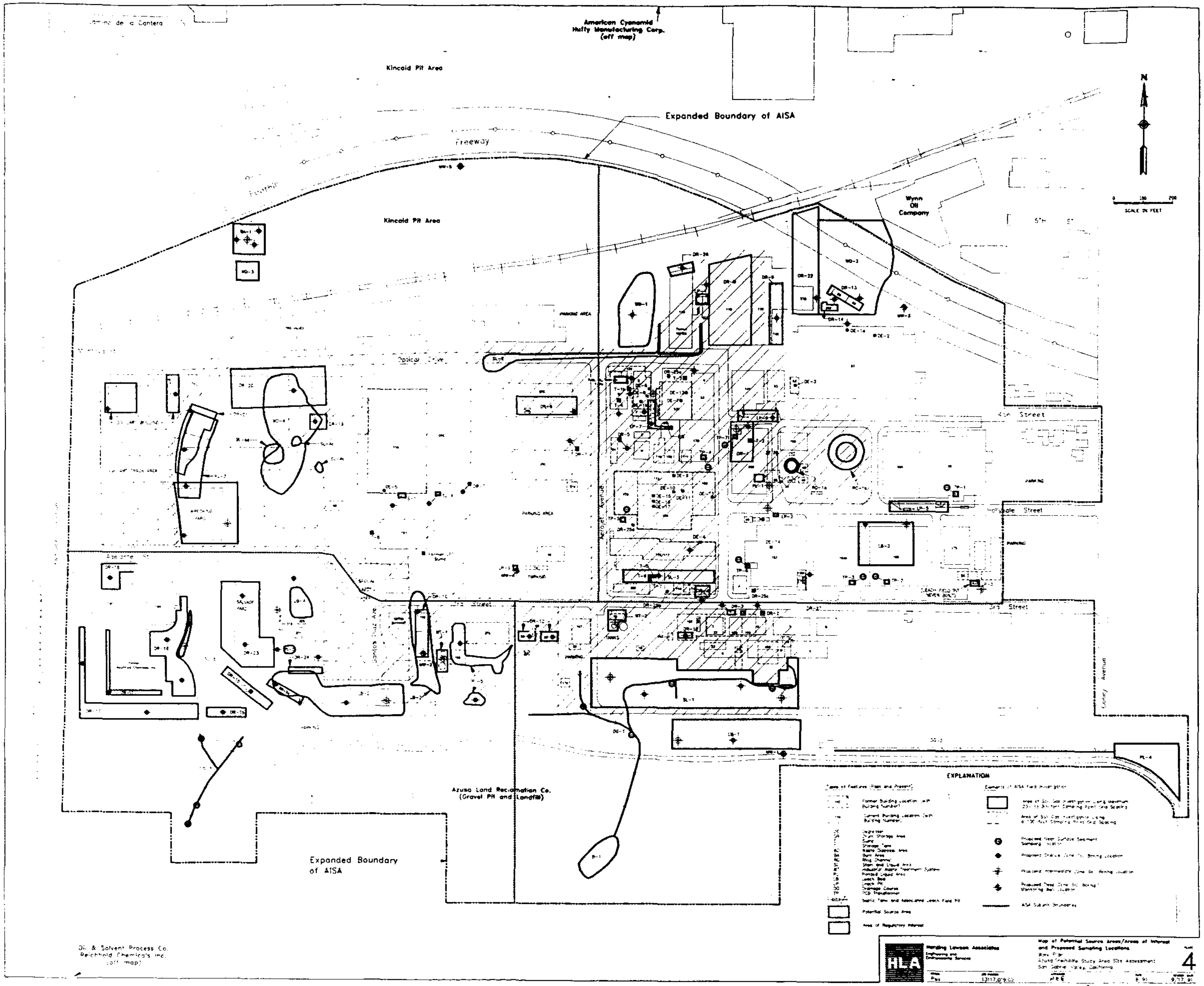

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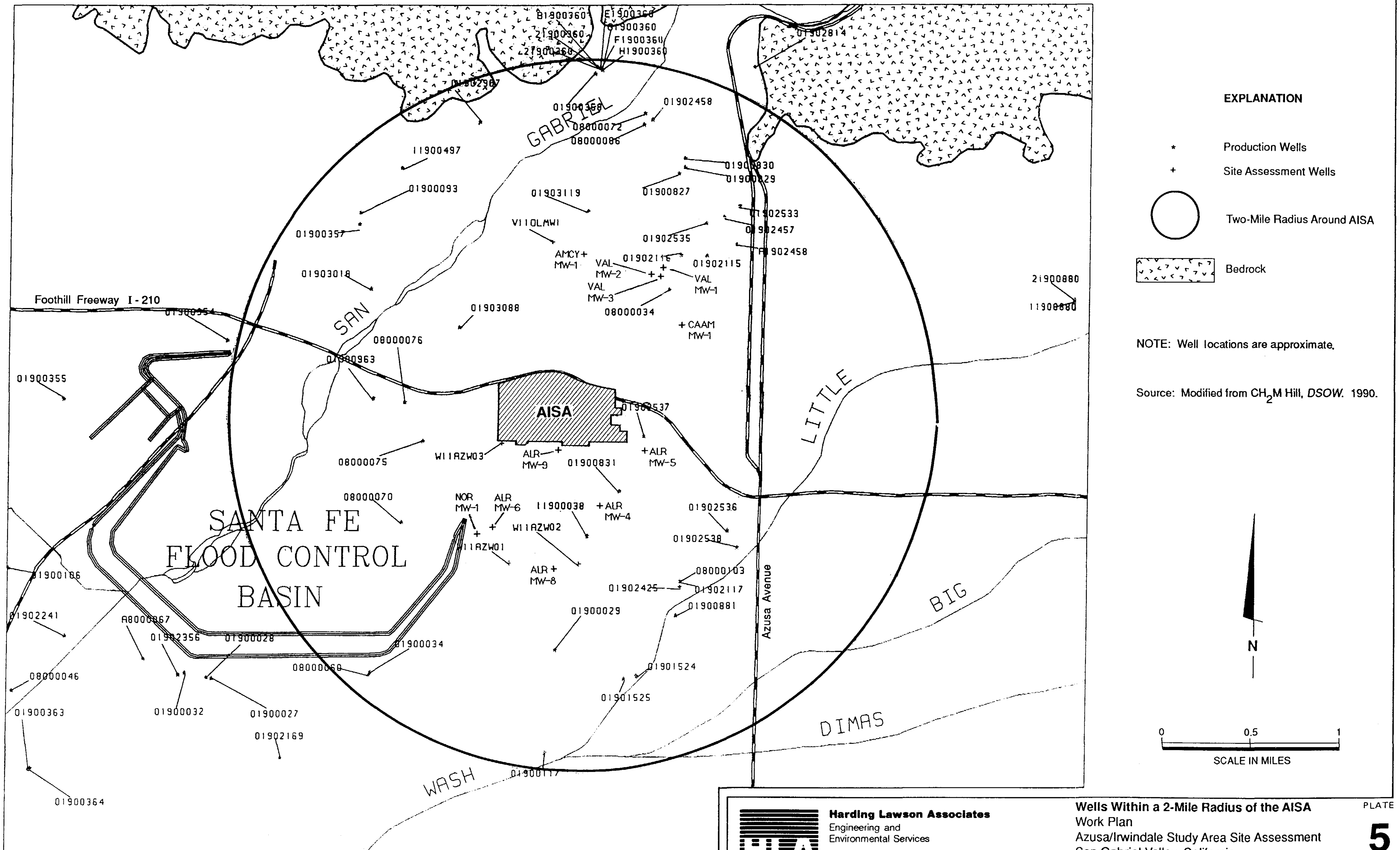


Harding Lawson Associates Engineering and Environmental Services	**Wells Within a 2-Mile Radius of the AISA** Work Plan Azusa/Irwindale Study Area Site Assessment San Gabriel Valley, California		PLATE **5**
DRAWN CSN	JOB NUMBER 13117,019.02	APPROVED	DATE 6/91

REVISED DATE

APPENDIX A

APPENDIX A

5-YEAR INCREMENT PLOT PLANS 1955 - PRESENT, AND BUILDING INVENTORY AND DIVESTITURE INFORMATION

TABLE A1

AEROJET BUILDING INVENTORY

Table A1. Aerojet Building Inventory

Building No.	Year Acquired	Year Demolished/ Released	General Use
1	1943	70	Storage 1955 Rest Room
2	1943	70	Storage 1955 Maintenance
3	1943	70	Storage 1955 Maintenance
4	1943	70	Storage 1955 Maintenance
5	1943	70	Storage 1955 Fire House
6	1943	7-62	Grinding 1955 Maintenance
7	1943	43±	Process 1955 Maintenance
8	1943	1960	Cooker/Heater 1955 Mix Station
9	1943	66	Cooker/Heater 1955 Mix Station
10	1943	68	Batch/Mis 1961 Igniter Assy.
11	1943	68	Ovens 11961 Storage
12	1943	66	Assembly 1961 Test Lab
13	1943	66-68	Storage 1961 Test Lab
14	1943	66-68	Pump House
15	1943	71	Office 1961 Lab
16	1943	71	First Aid/RR 1948 Lab
17	1943	69	Loading Dock Storage
18	1943	70	Magazine/Office 62 RR
19	1943	71	Test Station
20	1943	1960	Magazine Chem Lab Dry
21	194?	70	Lab Test
22	194?	5-62	Office
23	1948	71	Test Bay
24	194?	68	Storage
25	194?	58	
26	1948	58	Test Bay
27	194?	1960	Storage
28	194?	1960	Storage
29	194?	1960	Storage
30	194?	1960	Chem Lab Dry
31	194?	1960	Chem Lab Dry
32	194?	1960	Rest Room
33	194?	1960	Igniter Lab
34	19?	1960	Storage
35	194?	By 58	
36	194?	68	Igniter Assy.
37	194?	1960	Chem Lab Dry
38	194?	1960	Chem Lab Dry
39	194?	By 58	
40	1948	70	Chem Lab Dry
41	194?	By 58	

Table A1. Aerojet Building Inventory (continued)

Building No.	Year Acquired	Year Demolished/ Released	General Use
42	194?	69	Hydro Lab
43	194?	62	Ceramics Shop
44	194?	68	Power Press
45	194?	1960	Propellant Cold Storage
46	194?	66-67	Small Machine Shop
47	194?	66-67	Parts Storage
48	1948	71-72	Ins. Repair
49	194?	62-65	Hyd. Test Shop
50	194?		Fuel Storage/Chem Storage (62 Relocate)
51	1948	71	Office & Shop
52	1948	71	Machine Shop
53	195?		Physical Measuring/Research Labs & Office
54	195?	70	Storage Magazine
55	195?	70	Storage Magazine
56	1951	71	Chem Lab
57	1951	71 trans to AIL	Machine Shop
58	195?	71	Offices
59	1952		Offices
60	195?	By 58	?
61	195?	By 58	?
62	1948	71	Metal Parts Fab
63	1948	70	Machine Tool Repair
64	195?	By 58	
65	195?	67-68	Machine Shop/Tool Crib
66	195?	61D	Lab
67	195?	61	Lab
68	195?	By 58	
69	1948	61 Reloc. In-Plt	Storage
70	195?	67-68	Test
71	1948	61	Storage/Lk Room
72	195?	63-64	Office
73	195?	71	Control Room
74	195?	71	Test Bay
75	1949	71	Shop & Assy.
76	195?	61 (66-68) Reloc.-In-Pit	Shop & Assy.
77	1949	71	Chem Lab

Table A1. Aerojet Building Inventory
(continued)

Building No.	Year Acquired	Year Demolished/ Released	General Use
78	195?	71	Test Stand
79	195?	By 58	
80	195?	By 58	
81	194?	71	Test Bay
82	1949	71	Chem Lab
83	1958?	6-62	Test Bay
84	1949	71	Garage
85	1950	71	Test Bay
86	195?	By 58	
87	1955	71	Test Bay
88	195?	71	Pump House
89	195?	71	Test Bay
90	195?	71	Test Lab
91	195?	61	Propellant Machine
92	195?	69	Chem Lab/Storage
93	195?	5-62	Storage
94	195?	65	Metalizing Stat
95	1952	70	Magazine
96	195?		Storage
97	195? 61 AF	61	Compressor Room
98	195?	68	Guard Office
99	195?	69	Storage Vault
100	1950	73-74	Personnel Office
101	1948	1960	Co. Store Office
102	1948	1960 & 62	Shop
103	195?	1960	Chem Lab
104	1948	1960	Co. Store
105	195?	68	Propellant Cond.
106	195?	4-63	Acid Storage
107	195?	71	Compressor Room
108	195?	By 58	
109	194?	70	Mix Station/Office
110	1948	70	Mix Station/Office
111	195?	By 58	
112	1948		Propellant Curing/Shop
113	195?	1960	Storage
114	195?	68	Chem Lab
115	1948	70	Co. Store
116	1948		Machine Shop/Hydro Lab

Table A1. Aerojet Building Inventory (continued)

Building No.	Year Acquired	Year Demolished/ Released	General Use
117	195?	By 58	
118	1948		Stores
119	1948	76 Trans to AIL	Office
120	195?	By 58	
121	195?	By 58	
122	195?	By 58	
123	1956	69	Rest Room
124	1957	70	X-Ray/Office/Shop
125	195?	By 58	
126	1962		Machine Shop 1971k Maintenance
127	196?	By 58	
128	195?	71	Acid Storage
129	195?	1960	Acid Storage
130	195?	68	Storage
131	1948	70	Shop
132	1948	70	Shop
133	194?	61	Instrumentation Shop
134	1948	71	Office/Shop/Storage
135	1950	71	Office/Shop/Storage
136	1948	70	Chamber Cleaning Area
137	1961		Guard Office
138		61	Shop
139		By 58	
140		By 58	
141	1951		Cafe
142	1948	70	Drum Storage
143	194? AF	67-68	Fuel Storage
144		By 58	
145		By 58	
146	1954	7-63	Storage
147	1957?	1960-71	Cryo Lab
148	195?	1960	
149	1954	70	Magazine
150	1954	71	RR/Lab
151	195?	69	Tank House
152	195?	71	Test Bay
153	1955	70	Storage (Cylinders)
154		70	Magazine
155		71	Storage (Cylinders)

Table A1. Aerojet Building Inventory
(continued)

Building No.	Year Acquired	Year Demolished/ Released	General Use
156	1961	71	Test Bay
157	1956	70	RR
158		61	Storage
159	1957	70 (trans to AIL)	Office/Manufacturer
160	1957		Office
161	1959	73-74	Office
162	1958	69	Mezzanine
163	1958	70 (trans to AIL)	Shop
164	195?	5-63	Office
165	1958	70	RR
166	1959	70 (trans to AIL)	Materials Lab
167	1957	71	Envir. Test
168	1959		Shop
169	1959	71	Shop
170	1959	71	Shop
172	195?	71	Radiation Pit
173	1958	71	Maintenance Shop
174	1959	70	Guard Stat
175	1960		Chem Lab-82-Electronic/S
176	1961	71	Test Stand
177	1959	71	Test Stand
178	1960		Storage
179	1960		Shop
180	1961	71	Nak Test
181	1960	71	Chem Lab
182	1960	Trans to AIL 69	Refrigeration Room
183	1961		Office/Lab/Shop
184	1961	71	Chem/Lab
185	1961	71	Metals Preparation
186	1961	70	Cold STG
187	1962		Snap 8 Test Bldg
188	1963		Paint Booth
189		70 (trans to Glass Co.)	Glass Lab
190	1962	70 (trans to Glass Co.)	Glass Lab
191		70 (trans to Glass Co.)	Compressor Rm
192	62	62-65	

Table A1. Aerojet Building Inventory
(continued)

Building No.	Year Acquired	Year Demolished/ Released	General Use
193	62	62-65	
194	1962		Office /Assembly
195	1962	71	Storage
196	1962	71	Storage
197	1962	68	Fuel Storage
198	62	68	Fuel Storage
199	1966		Underwater Test
200	1967		Assembly/Test
201	1982		Test
202	1982		Storage
300		By 58	
301		70	Test
302		1960	RR
303		3-63	Office
304		8-62	Office/Storage
305		1960	Storage
306		By 58	
307	1948	70	Water Conditioning
308		67-68	Boiler Room
309		68	Conditioning Room
310	1948	71	Storage
311	1948	69	Assembly/Storage
312	1948	70	Assembly/Storage
313	1948	70	Chem Lab
314		68	Mix Station
315		71	Oven
316	1948	70	Cafe/Office
317	1965	70	Alclo Press
318	1965	70	Alclo Lab
319		62	Office
320	1948	71	Shop
321	1948	60	Vibration Lab
322	1948		Storage/Maintenance
323		70	Fire Lab
324	1959	70	Fire Lab
325		70	Storage

TABLE A2

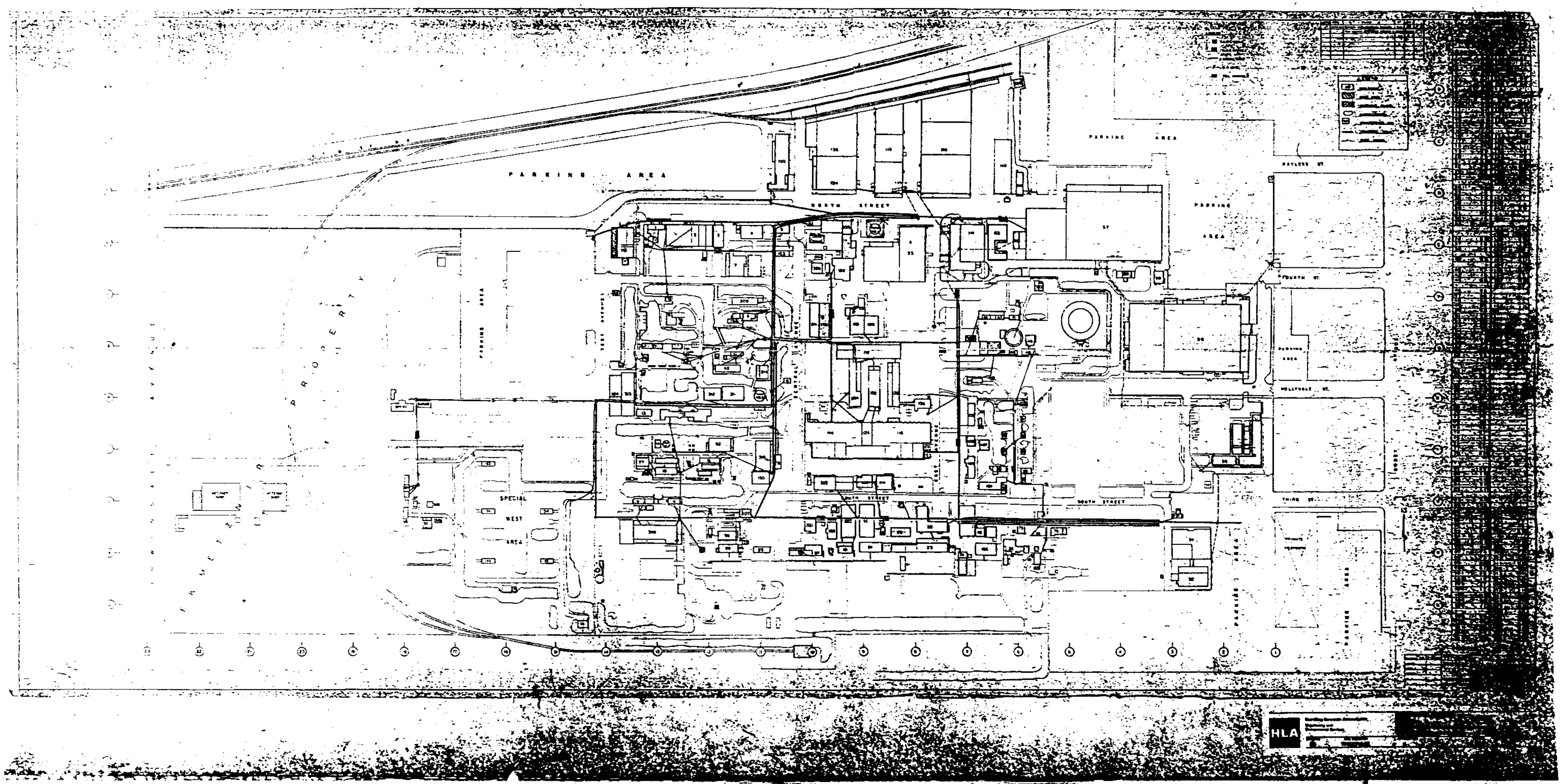
AEROJET INVESTMENTS, LTD.
LEASES/SALES OF AZUSA LAND

Table A2. Aerojet Investments, Ltd.
Leases/Sales of Azusa Land

Buyer/Lessee	Date	Description	No. of Acres
Ronald L. Wages (DeBeck Homes)	11-08-73	Lease of portion of Bldg. 57 to 12-31-73	4.76 (plus improvements)
Rainbird Sprinkler Mfg.	7-16-73	Lease of portion of Bldg. 57 to 6-30-75	4.76 (plus improvements)
Varitronics, Inc.	9-15-73	Lease of portion of Bldg. 57 to 8-31-77	4.76 (plus improvements)
Martin's Vending	5-23-75	Lease of portion of Bldg. 57 to 6-30-79	4.76 (plus improvements)
Howell Inc.	1-01-76	Lease of portion of Bldg. 57 to 6-08-79	4.76 (plus improvements)
Kennedy Co.	9-03-77	Lease of portion of Bldg. 57 to 11-15-79	4.76 (plus improvements)
Leggett & Platt (Howell's successor)	6-08-79	Lease of portion of Bldg. 57 to present	4.76 (plus improvements)
Structural Composite Industries Inc.	2-01-71	Lease of portion of Bldg. 159 to 10-31-77	6.63 (plus improvements)
Optical Radiation Corporation	2-01-72	Lease of portion of Bldg. 159 to 10-31-77	6.63 (plus improvements)
Optical Radiation Corporation	10-77	Sales of Building 159	6.63 (plus improvements)
Optical Radiation Corporation	2-01-72	Lease of portion of Bldg. 163 to 12-31-78	2.26 (plus improvements)
Gamut Designs	5-18-72	Lease of portion of Bldg. 163 to 6-21-75	2.26 (plus improvements)
Structural Composites Industries, Inc.	2-01-75	Lease of portion of Bldg. 163 to 2-28-80	2.26 (plus improvements)
Johnston Pump Company	1-01-76	Lease of portion of Bldg. 163 to present	2.26 (plus improvements)
Kaiser Glass Fibre	8-10-70	Bldgs. 189, 190 & 191 to 3-31-75	5.913 (plus improvements)
Reichhold Chemical Co.	4-01-75	Bldgs. 189, 190 & 191 to 11-30-79	5.913 (plus improvements)
California Liquid Gas	2-01-75	55,000 sq. ft. of land adjacent to Bldg. 189 to 11-30-79	5.913 (plus improvements)
Reichhold Chemical Co.	11-79	Sale of Bldgs. 189, 190, 191	
Howell Inc.	11-01-76	Lease of Bldg. 199 to present	2.33 (plus improvements)
Optical Radiation Corporation	12-01-76	Lease of Portion of Bldg. 199 to 8-31-77	2.33 (plus improvements)
<u>Sales of Raw Land</u>:			
Reichhold Chemical Co.	11-76		8.72
Irwindale Redevelopment Agency	11-77		.26
Optical Radiation Corporation	5-78		1.65

Table A2. Aerojet Investments, Ltd. Leases/Sales of Azusa Land (continued)

Buyer/Lessee	Date	Description	No. of Acres
Irwindale Redevelopment Agency	7-78		.003
Irwindale Redevelopment Agency	10-78		3.28
Irwindale Redevelopment Agency	11-77	(Dedication of roadway)	.364
Optical Radiation Corporation	5-81		2.395



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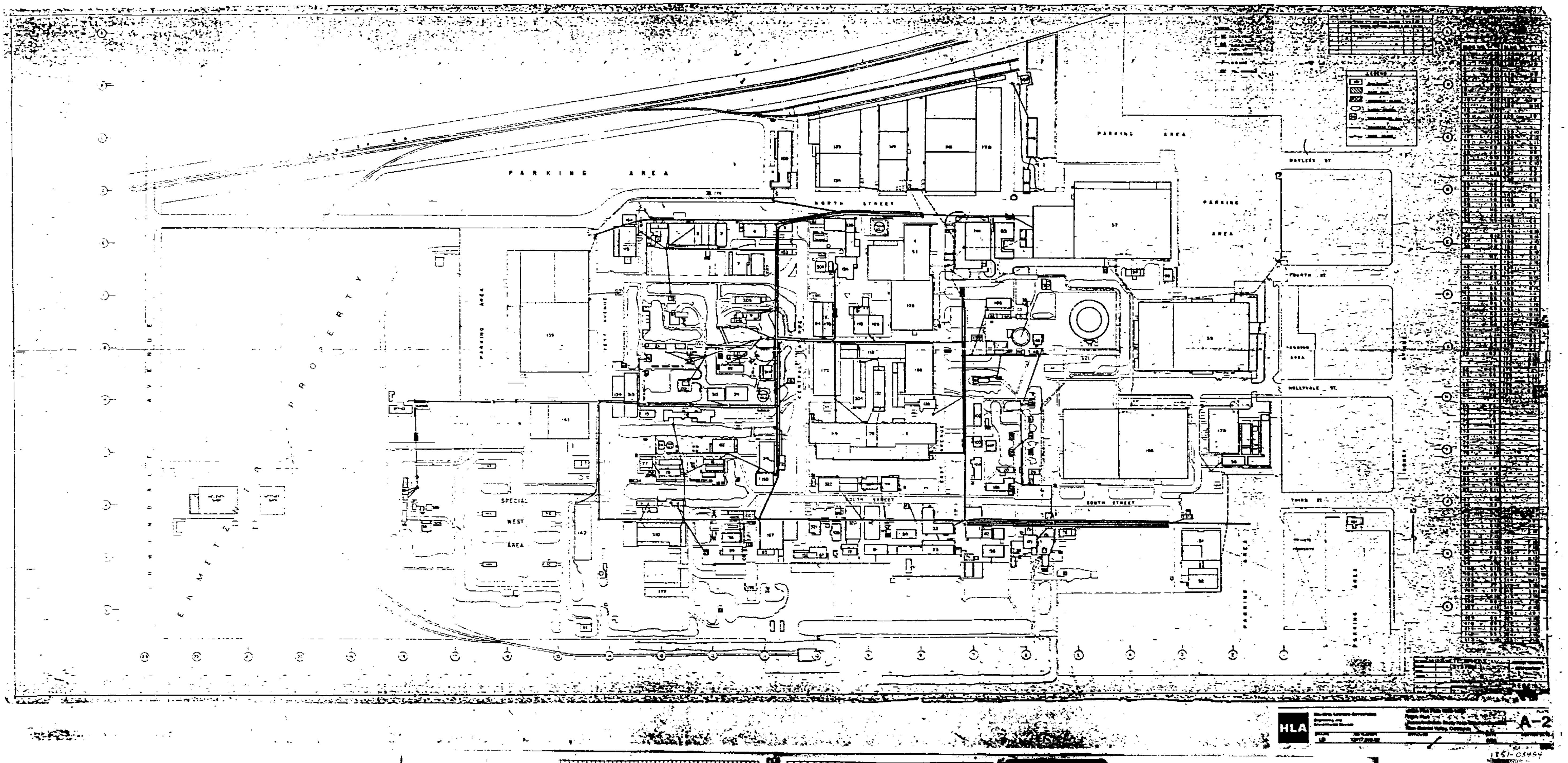

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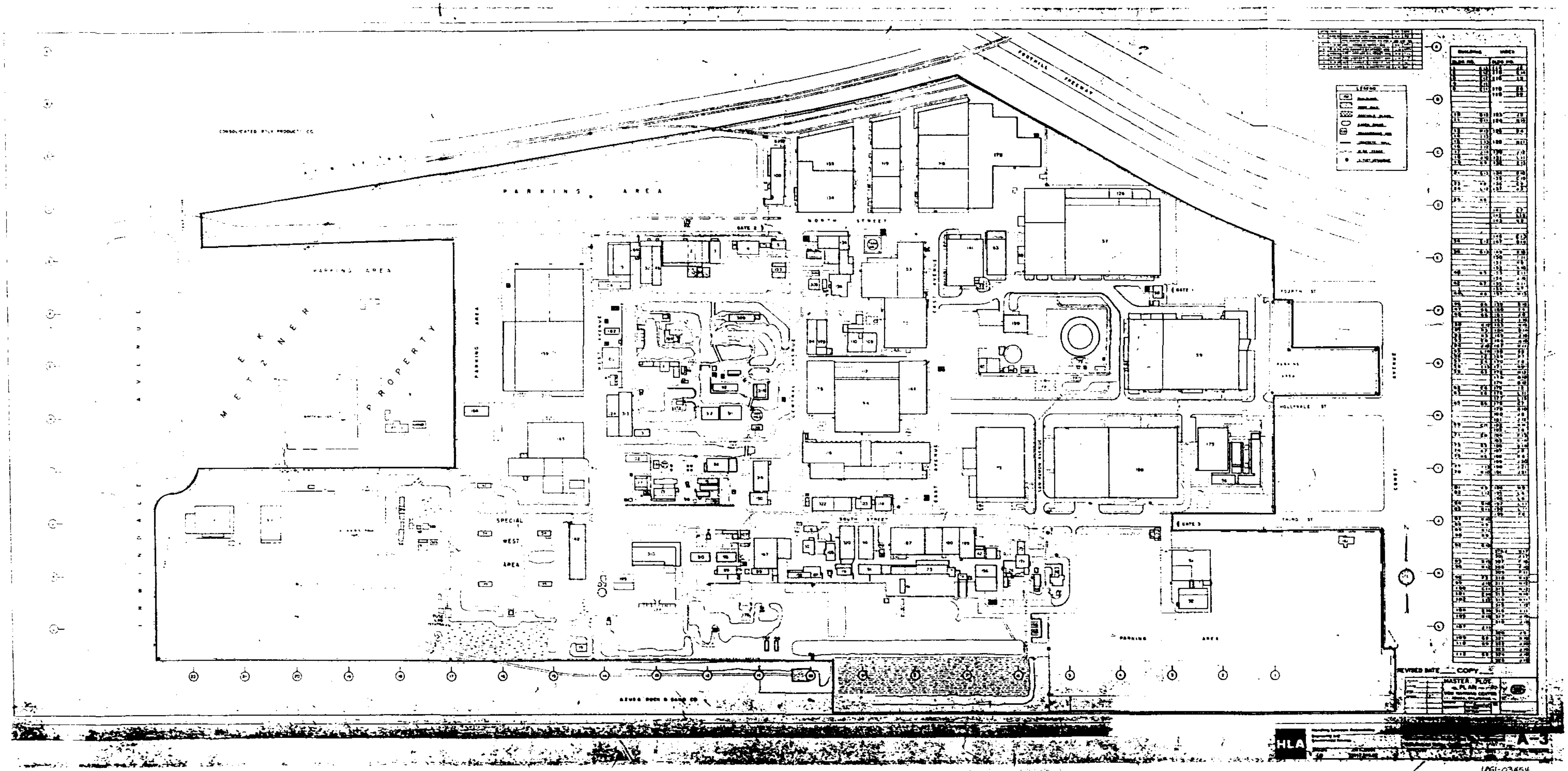

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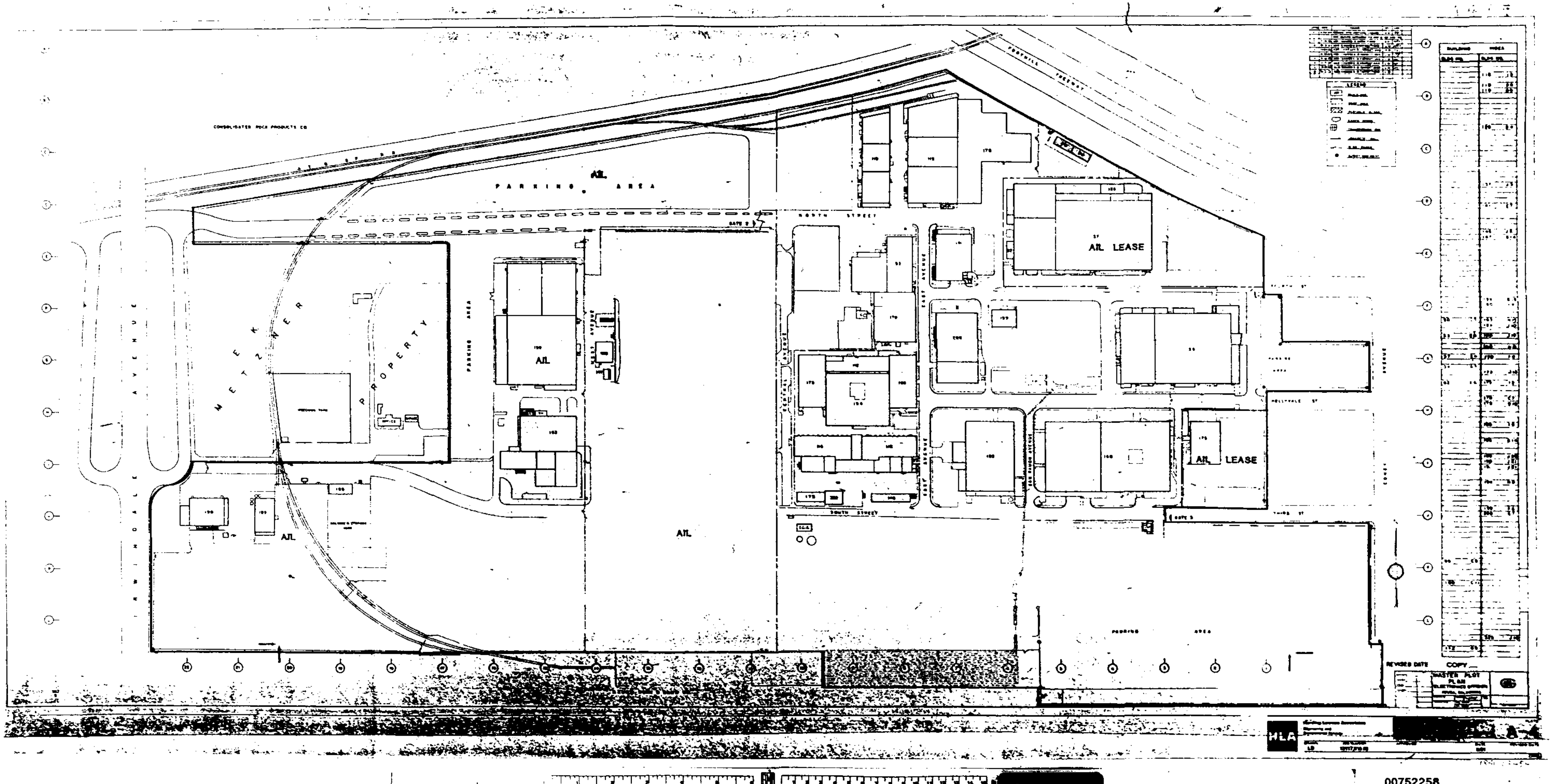

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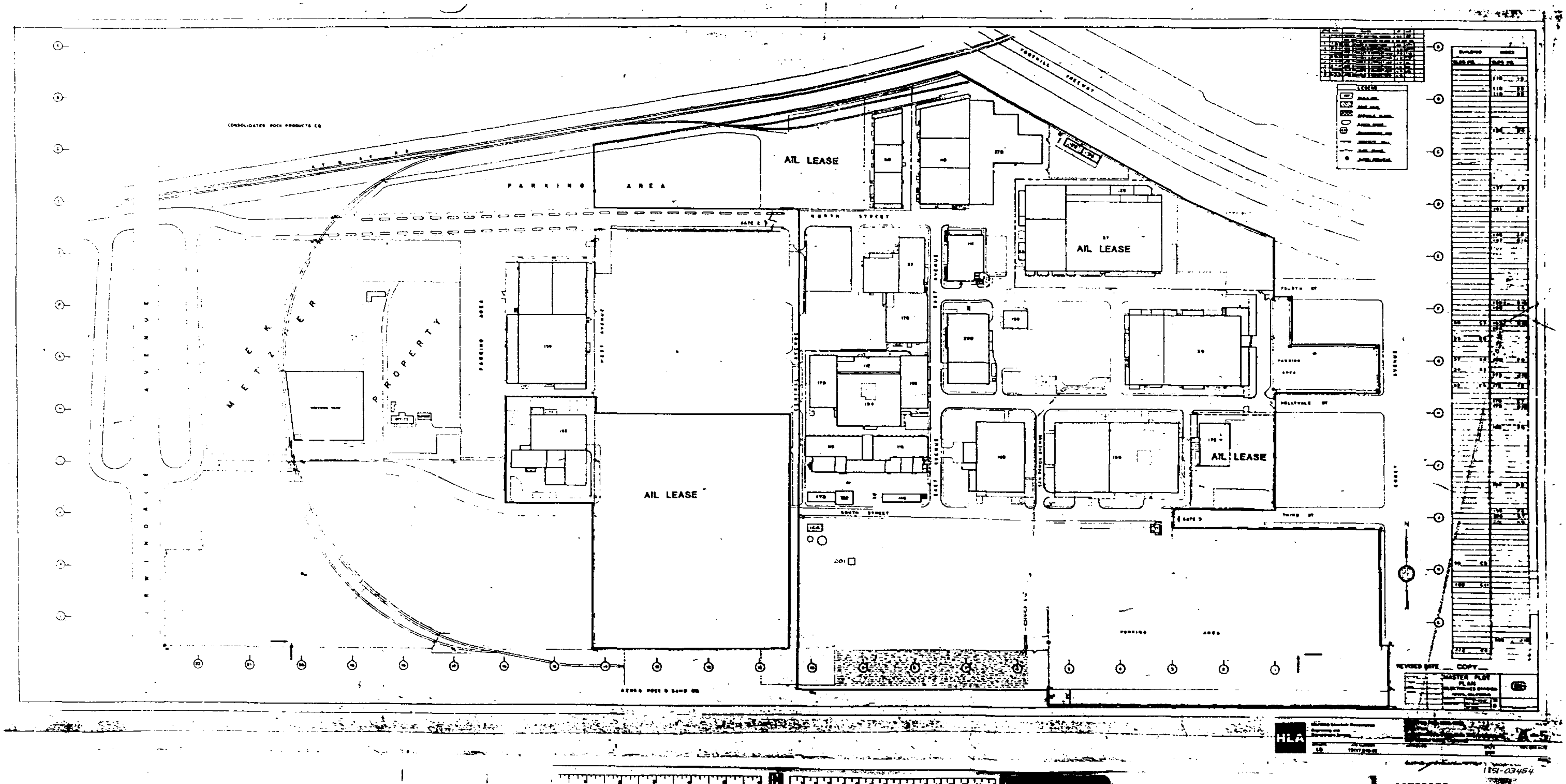

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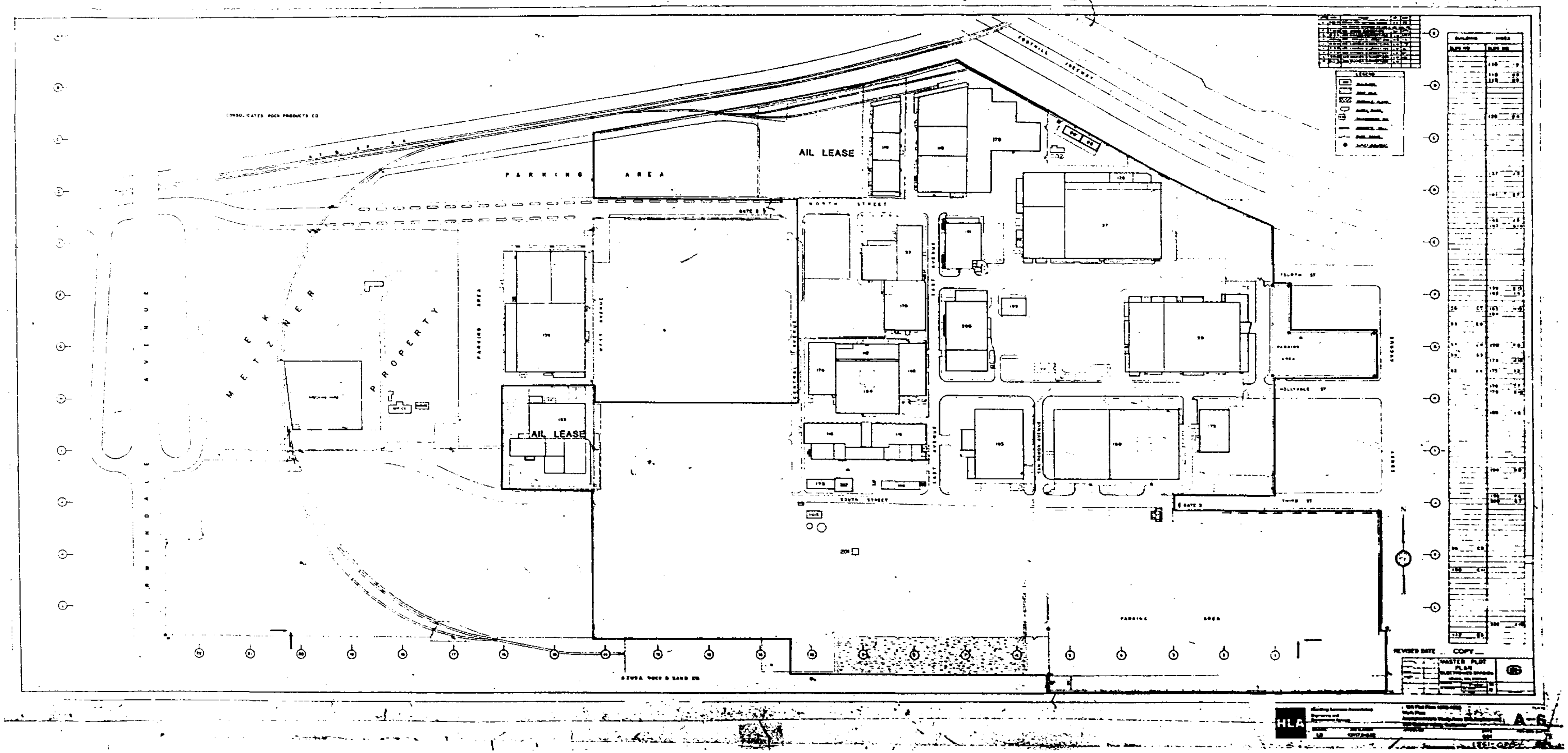

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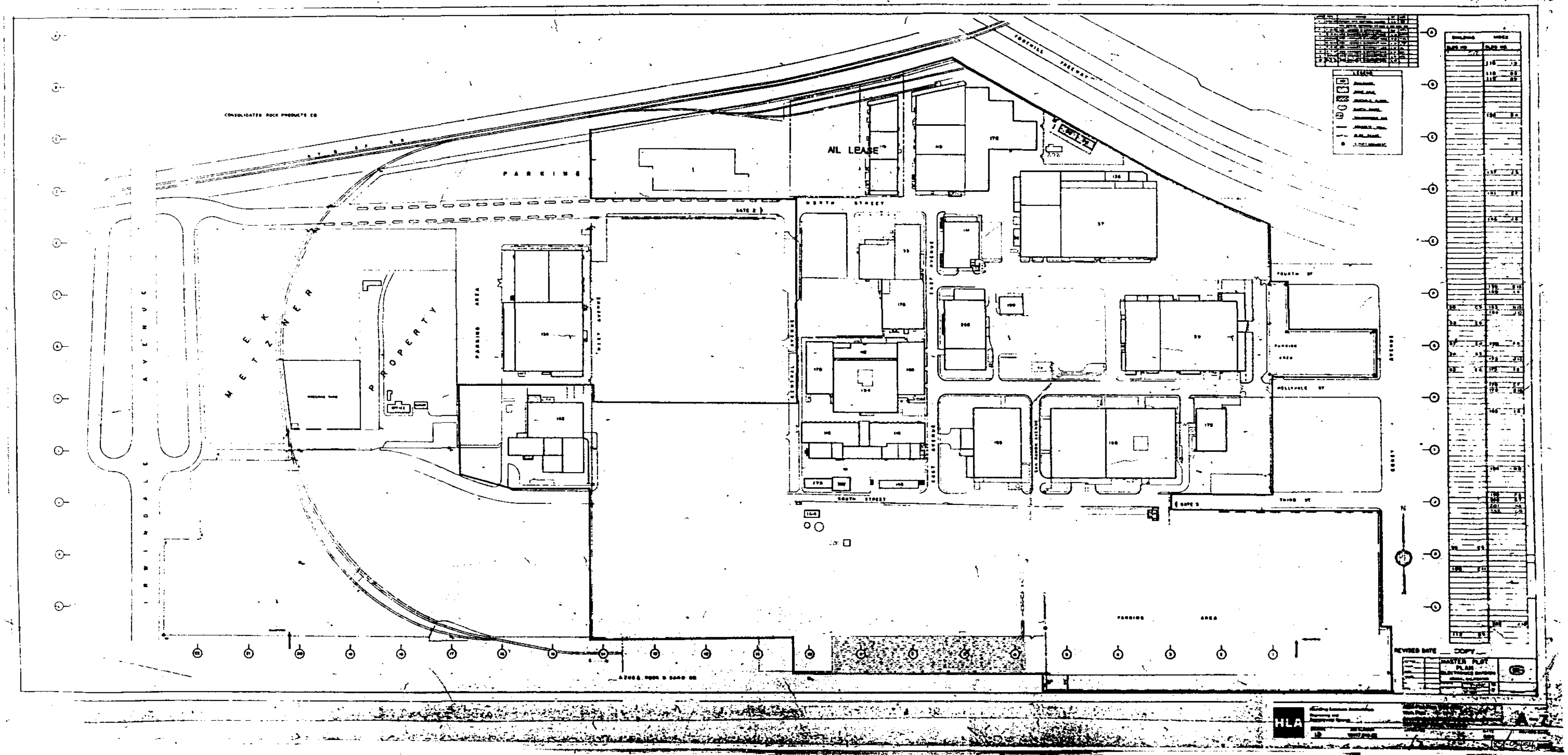

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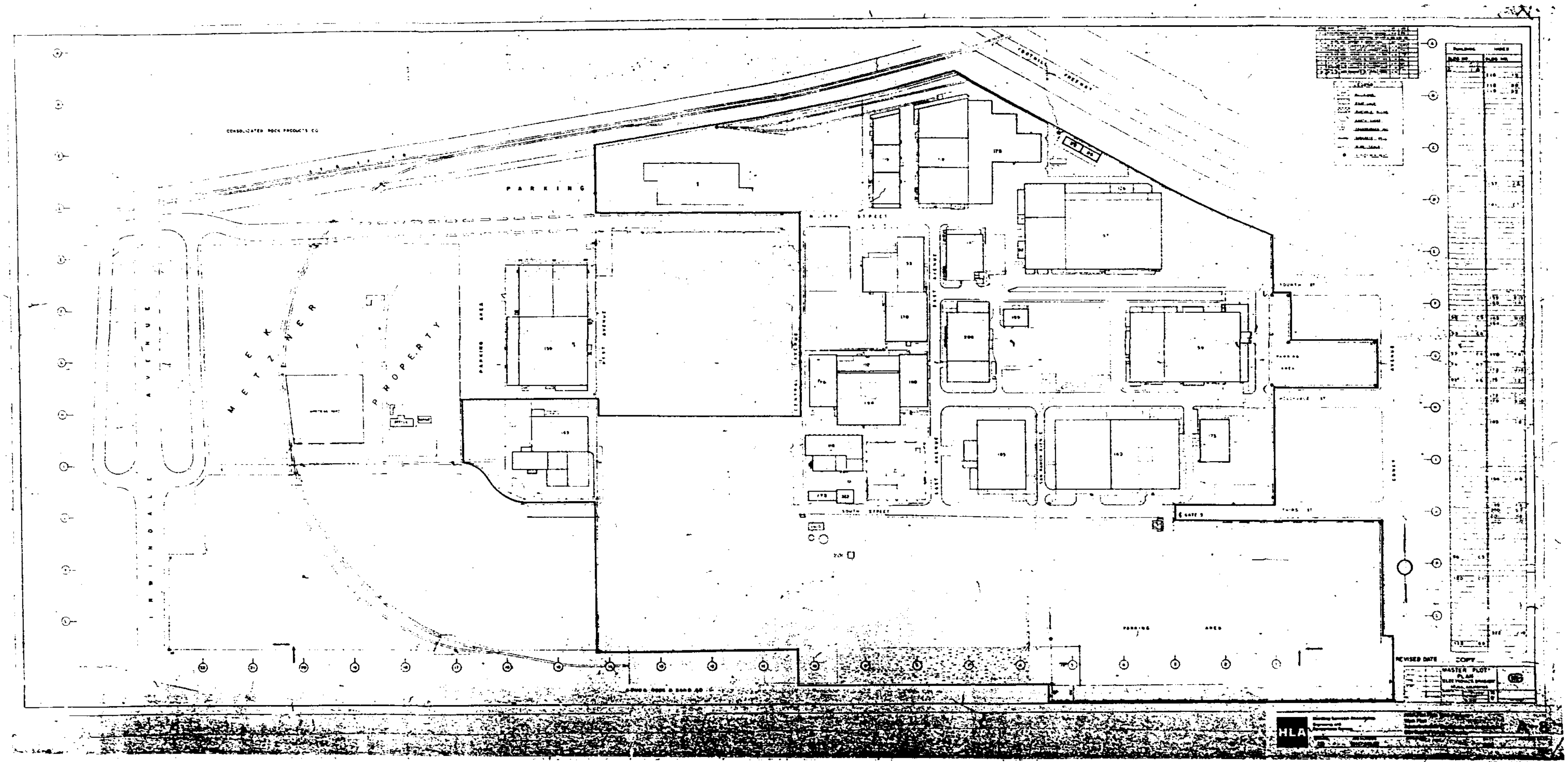

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APPENDIX B

APPENDIX B

DETAILED DESCRIPTIONS OF POTENTIAL SOURCE AREAS AND REGULATORY AREAS OF INTEREST

APPENDIX B
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APPENDIX B
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(continued)

APPENDIX B
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(continued)

B.1 Degreasers

During the period from 1943 to 1971, the Azusa facility had a total of eight immersion degreasers in use at various times (*Aerojet, 1988*, 104(e), Exhibit 5). Degreasers were supplied with fresh solvent from 55-gallon drums. Prior to 1953, spent degreasing solvents were pumped from the degreasers into 55-gallon drums. These solvents were then sold to an offsite reclaimer. In 1953, a program was started to send the used solvent to a reclaimer and to return the processed solvent to Aerojet for use. Historic documentation indicates that carbon tetrachloride was used at the facility for cold cleaning of solid propellent equipment and rocket motors between 1947 and 1953.

Prior to 1967/68, Aerojet degreasers used TCE and PCE as solvents. In 1967/68, Los Angeles County Air Pollution Control District Rule 66 eliminated the practical use of TCE in degreasers, and Aerojet's remaining TCE degreasers were converted to use 1,1,1-TCA or were removed from service. Waste solvents and lubricants were sent to Oil and Solvent Process Company, Azusa, California, until 1976. After that date, waste solvents and other wastes were transported to an offsite Class 1 landfill (*Aerojet, 1983*, 104(e), page 33).

In 1971, the last of the original 8 degreasers was removed. Records indicate that smaller vapor degreasers were air quality permitted at the Aerojet facility beginning in 1976 (*Aerojet, 1983*, 104(e), Exhibit). No documentation is available regarding degreasers at the Aerojet facility from 1971 to 1976. As of 1988, Aerojet had 7 small vapor degreasers in operation, 6 of which used Lonco 113 (a mixture of 1,1,1-TCA, trichlorotrifluoroethane [Freon 113, Freon TF], and isopropyl alcohol), and one of which used 1,1,1-TCA. Two additional small degreasers installed in 1976 (which used Freon

TF and Lonco 113 respectively) were placed in storage in 1983 (*Aerojet, 1988*, 104(e), Exhibit 5).

As summarized below, specifications of the 17 degreasers indicate that seven used TCE (one of which was relocated from Building 57 to 136), one used PCE, and the remainder (more recent) degreasers use or used either Lonco 113 or 1,1,1-TCA. Based on the individual sizes of the degreasers and on historical information, two degreasers were installed, in part, below grade (DE-1a and b, and DE-6). The two remaining degreasers were smaller above-grade units installed in buildings above concrete slab floors, except for DE-4, which was located under a shed-type roof, on an floor type of unknown construction.

As indicated above, waste solvents from degreasers were pumped into 55-gallon drums for offsite disposal and/or recycling, and fresh solvent was introduced from new 55-gallon drums. Because the degreasers were inside buildings (except DE-4) and within working areas, any accidental release of fresh or waste solvent from above-grade degreasers would have been quickly noticed, reported, and clean up to remove the resulting health and safety hazard. Based on these considerations, four degreaser locations, DE-1a, DE-1b, DE-6, and DE-4 are identified as potential source areas. However, at the request of the EPA/RWQCB, the remaining 13 degreasers will also be investigated during the AISA Site Assessment.

B.1.1 Degreaser DE-1 (a and b)

During the 1950s through 1968, former degreaser DE-1 was initially located in the north side of Building 57, where it has been designated DE-1a; it was then moved to Building 136, where it has been designated DE-1b. DE-1 (a and b) had approximate dimensions 4 x 10 x 7 feet and reportedly used TCE as a solvent from 1951 to 1967 and 1,1,1-TCA from 1967 to 1968. No information was found regarding the time periods DE-1 was operating in Building 57 versus operating in Building 136.

B.1.2 Degreaser DE-2

Former degreaser DE-2 (Plate 4) was in the north side of Building 57, east of DE-1, from the 1950s to 1971. DE-2 was approximately 9 x 3 x 4 feet in dimension. It used TCE as a solvent from 1951 to 1967 and used 1,1,1-TCA from 1967 to 1971, when it was decommissioned.

B.1.3 Degreaser DE-3

Former degreaser DE-3 (Plate 4) was in Building 62, from the 1950s to 1971. Building 62 was located along the west side of Building 57. DE-3 was approximately 3 x 3 x 4 feet in dimension. It used PCE as a solvent from the 1950s to 1967 and used 1,1,1-TCA from 1967 to 1971, when it was decommissioned.

B.1.4 Degreaser DE-4

Former degreaser DE-4 (Plate 4) was in the northeastern portion of Building 116/117 from the 1940s to 1956. DE-4 was approximately 2 x 2 x 2 feet in dimension and used TCE as a solvent until 1956, when it was decommissioned.

B.1.5 Degreaser DE-5

Former degreaser DE-5 (Plate 4) was in the southwestern portion of Building 159 from 1958 to 1971. DE-5 was approximately 3 x 5.5 x 5 feet in dimension and used TCE as a solvent until 1971, when Building 159 was leased to ORC. No information regarding the status of this degreaser since 1971 was available.

B.1.6 Degreaser DE-6

Former degreaser DE-6 (Plate 4) was in the central portion of Building 136 from the 1940s to 1968. DE-6 was approximately 6 x 12 x 10 feet in dimension and used TCE as a solvent until 1968, when it was decommissioned.

B.1.7 Degreaser DE-7

Former degreaser DE-7 (Plate 4) was in the west-central portion of Building 53 from the 1950s to 1968. DE-7 was approximately 3 x 4 x 6 feet in dimension and used TCE as a solvent until 1968, when it was decommissioned.

B.1.8 Degreaser DE-8

Former degreaser DE-8 (Plate 4) was in the central portion of Building 136, south of DE-6, from 1952 to 1969. DE-8 was approximately 4.5 x 3 x 6 feet in dimension and used TCE as a solvent until 1969, when it was decommissioned.

B.1.9 Degreaser DE-9

Degreaser DE-9 (Plate 4) was in the east-central portion of Building 112 from 1976 to 1982. DE-9 was approximately 5 x 1.5 x 3 feet in dimension and used trichlorotrifluoroethane (Freon 113, Freon TF) as a solvent until 1983, when it was placed in storage.

B.1.10 Degreaser DE-10

Degreaser DE-10 (Plate 4) was in the north-central portion of Building 194 from 1976 to 1985. DE-10 is approximately 3 x 1.5 x 3 feet in dimension and used Lonco 113 as a solvent.

B.1.11 Degreaser DE-11

Degreaser DE-11 (Plate 4) has been in the northeast portion of Building 194, east of DE-10, from 1976 to present. DE-11 is approximately 2.5 x 2.5 x 3.5 feet in dimension and uses Lonco 113 as a solvent.

B.1.12 Degreaser DE-12

Degreaser DE-12 (Plate 4) was in the northeastern portion of Building 53A from 1976 to 1988 DE-12 was scraped prior to 1991. DE-12 was approximately 4 x 2 x 2 feet in dimension and used 1,1,1-TCA as a solvent. From 1968 to 1988, other solvents including acetone, methyl ethyl ketone (MEK), and isopropyl alcohol (isopropanol, 2-propanol, IPA) have also been used in small quantities in Building 53 for bench-scale hand cleaning of small electronic components with Q-tips, tissues, and other small applicators. Solvents used in such cleaning operations typically evaporate and do not result in a liquid waste.

B.1.13 Degreaser DE-13

Degreaser DE-13 (Plate 4) was in the east-central portion of Building 168 from 1976 to 1988. DE-13 is approximately 4 x 2 x 3 feet in dimension and used Lonco 113 as a solvent.

B.1.14 Degreaser DE-14

Degreaser DE-14 (Plate 4) was in the central portion of Building 183 from 1976 to 1982. DE-14 was approximately 1.5 x 5 x 3 feet in dimension and used Lonco 113 as a solvent until 1982, when it was sold.

B.1.15 Degreaser DE-15

Degreaser DE-15 (Plate 4) was in the west-central portion of Building 194, from 1980 to at least 1982. DE-15 is approximately 2.5 x 2.5 x 3.5 feet in dimension and used Lonco 113 as a solvent.

B.1.16 Degreaser DE-16

Degreaser DE-16 (Plate 4) has been in the west-central portion of Building 194, south of DE-16, from 1983 to present. DE-16 is approximately 2.5 x 2.5 x 3.5 feet in dimension and uses Lonco 113 as a solvent.

B.1.17 Degreaser DE-17

Degreaser DE-17 (Plate 4) has been in the west-central portion of Building 194, south of DE-17, from 1983 to present. DE-17 is approximately 2 x 2 x 3 feet in dimension and uses Lonco 113 as a solvent.

B.2 Drum Storage Areas

A total of 27 drum storage locations has been identified by either EPA or Aerojet within the boundary of the AISA. On the basis of review of aerial photographs and 3007/104(e) response documentation as described herein, drum storage areas DR-1 through DR-24, and DR-26 and DR-27 have been identified as potential source locations. Drum storage areas DR-25a through DR-25d are not identified as potential source locations based on age and building construction. However, at the request of the EPA/RWQCB, all drum storage areas have been incorporated into the AISA Site Assessment. The following provides a description of each area.

B.2.1 Drum Storage Area DR-1

Former drum storage area DR-1 (Plate 4) was located in Aerojet Area 6 (*Aerojet, 1988*, 104(e), page 27, Attachment A) that is currently the north end of existing Building No. 200. Drum storage area DR-1 was open to the air and used for the storage of miscellaneous drums during a period beginning before 1947 and running through approximately 1970. The DR-1 area can be seen on 26 of the 48 aerial photographic prints provided by the EPA, but only three prints (EPA Prints 8, 9, and 10, from 1951) show the presence of drums. Drum storage area DR-1 was asphalt paved, with the exception of a small area just north of the pavement where it appears (based on the double-stacking of drums) that emptied drums were temporarily stored. No documentation was found regarding the products stored in drums in this area.

B.2.2 Drum Storage Area DR-2

Former drum storage area DR-2 (Plate 4) was located in Aerojet Area 5 (*Aerojet, 1988,* 104(e), page 27, Attachment A) south of currently existing Building 183 and within the Proving Grounds. Drum storage DR-2 was open to the air and used for the storage of miscellaneous drums during a period beginning before 1947 and running through approximately 1970. The DR-2 area was visible on only 1 of the 48 aerial photographs provided by EPA (EPA Print 16, from 1952). Drum storage area DR-2 was asphalt paved. No documentation was found regarding the products stored in drums in this area.

B.2.3 Drum Storage Area DR-3

Former drum storage area DR-3 (Plate 4) was located in Aerojet Area 4 (*Aerojet, 1988,* 104(e), page 27, Attachment A) near Building 180 and within the Proving Grounds. Drum storage DR-3 was open to the air and used for the storage of miscellaneous drums during a period beginning before 1947 and running through approximately 1970. The DR-3 area was visible on 6 of the 48 aerial photographs provided by EPA. Drum storage area DR-3 was asphalt paved. No documentation was found regarding the products stored in drums in this area.

B.2.4 Drum Storage Area DR-4

Former drum storage area DR-4 (Plate 4) was located in Aerojet Area 11 (*Aerojet, 1988,* 104(e), page 28, Attachment A) east of Building 114. Available documentation indicates that drum storage area DR-4 was asphalt paved and used for the storage of miscellaneous drums during a period beginning in approximately 1952 and running through approximately 1953. The DR-4 area was visible on 5 of the 48 aerial photographs provided by the EPA. However, only one print portrays the period of

DR-4 operation and it did not show the actual presence of drums. No documentation was found regarding the products stored in drums in this area.

B.2.5 Drum Storage Area DR-5

Former drum storage area DR-5 (Plate 4) was outside the east side of Building 84. DR-5 was improperly located on Figure 2-1 of the *SOW*. Building 84 was a garage facility and was used beginning in approximately 1941 and running through approximately 1971. The DR-5 area was visible on 2 of the 48 aerial photographic prints (Nos. 11 and 12) provided by the EPA. However, only four drums were visible in the aerial photographs, and two of the drums had no lids and may have been used solely as trash cans. No documentation was found regarding the products stored in drums in this area.

B.2.6 Drum Storage Area DR-6

Former drum storage area DR-6 (Plate 4) was located in Aerojet Area 13 (*Aerojet, 1988*, 104(e), page 28, Attachment A) south of former Building 305. Drum storage area DR-6 was asphalt paved and used for the storage of miscellaneous drums during a period beginning in approximately 1952 and running through approximately 1957. The DR-6 area was identified on 9 of the 48 aerial photographs provided by the EPA. However, none of the prints showed the actual presence of drums. No documentation was found regarding the products stored in drums in this area.

B.2.7 Drum Storage Area DR-7

Former drum storage area DR-7 (Plate 4) was located in Aerojet Area 14 (*Aerojet, 1988*, 104(e), page 28, Attachment A) north and northwest of Water Tank No. 2. Miscellaneous drum storage took place in DR-7 during a period beginning in approximately 1952 and running through approximately 1956. The DR-7 area was identified on 2 of the 48 aerial photographs provided by the EPA, and EPA Print 12 showed several (less than 10) drums present in two locations. No pavement was visible in these drum locations. However, several of the drums in Print 12 appear open-topped and may only have been used as trash cans. No documentation was found regarding the products stored in drums in this area.

B.2.8 Drum Storage Area DR-8

Drum storage area DR-8 (Plate 4) was located in Aerojet Area 1 (*Aerojet, 1988*, 104(e), page 27, Attachment B) at Building 118. Building 118 has been used from 1948 to present as a storage/receiving and inspection area. Newly purchased solvents in containers were temporarily stored on a concrete floor in Building 118 until transferred to other storage areas, or to areas of use. The DR-8 area was identified on 38 of the 48 aerial photographic prints provided by the EPA. However, none of the prints showed the actual presence of drums. No documentation was found regarding the products stored in drums in this area.

B.2.9 Drum Storage Area DR-9

Drum storage area DR-9 (Plate 4) was located in Aerojet Area 2 (*Aerojet, 1988*, 104(e), page 27, Attachment A) at the first location of former Building 142. Area DR-9 was used from 1948 to 1960 as a storage/receiving and inspection area for miscellaneous machinery and drums. Building 142 was asphalt paved, and covered with an open-sided building with a wood roof. Building 142 was moved to the southwest portion of the site in 1960 (see DR-10). The DR-9 area was identified on 11 of the 48 aerial photographs provided by the EPA, two of which (EPA Prints 13 and 14) may show the presence of drums outside of Building 142. No documentation was found regarding the products stored in drums in this area.

B.2.10 Drum Storage Area DR-10

Drum storage area DR-10 (Plate 4) was located in Aerojet Area 2A (*Aerojet, 1988*, 104(e), page 27, Attachment A) at the second location of former Building 142. Area DR-10 was used from 1960 to approximately 1970 as a storage/receiving area for miscellaneous machinery and drums. The relocated Building 142 was asphalt paved and covered with an open-sided building with a wood roof. The DR-10 area was identified on 14 of the 48 aerial photographs provided by the EPA. However, none of the prints show the presence of drums in this area. No documentation was found regarding the products stored in drums in this area.

B.2.11 Drum Storage Area DR-11

Drum storage area DR-11 (Plate 4) was located in Aerojet Area 7 (*Aerojet, 1988*, 104(e), page 27, Attachment A) at the first location of former Building 50 and within the Proving Grounds. Area DR-11 was used from before 1950 to 1962 as a drum storage building. Building 50 had a concrete floor and was an open-sided building with a metal roof. This building was moved to the west in 1962 (see DR-12). The DR-11 area was identified on 3 of the 48 aerial photographs provided by EPA. However, none of the prints show the presence of drums. No documentation was found regarding the products stored in drums in this area.

B.2.12 Drum Storage Area DR-12

Drum storage area DR-12 (Plate 4) was located in Aerojet Areas 7A and 8 (*Aerojet, 1988*, 104(e), pages 27 and 28, Attachment A) at the second location of former Building 50, near Building 96 within the Proving Grounds. Area DR-12 was used from before 1962 to 1969 as a fuel and chemical drum and small container storage area. Both Buildings 50 and 96 had concrete floors, and were covered with open-sided buildings with metal roofs. The DR-12 area was identified on 8 of the 48 aerial photographs provided by EPA. However, none of the prints show the presence of drums. No documentation was found regarding the products stored in drums in this area. Both Buildings 50 and 96 were moved to the northeastern area in 1969 (see DR-13).

B.2.13 Drum Storage Area DR-13

Drum storage area DR-13 (Plate 4) was located in Aerojet Area 7B (*Aerojet, 1988*, 104(e), page 27, Attachment B) at the third and second locations of Buildings 50 and 96, respectively. Area DR-13 has been used from 1969 to the present as a temporary storage building for newly purchased chemicals and empty drums. Building 50/96 is constructed as an open-air, covered shed. The DR-13 area was identified on 9 of the 48 aerial photographs provided by EPA. However, none of the prints show the presence of drums. The chemicals that have been stored temporarily in Building 50/96 to await transfer to areas of use include TCE (*Aerojet, 1988*, 3007/104(e), page 31).

B.2.14 Drum Storage Area DR-14

Drum storage area DR-14 (Plate 4) is located in Aerojet Area 9 (*Aerojet, 1988*, 104(e), page 28, Attachment B) at Building 202. Area DR-14 has been used from 1983 to the present as a hazardous waste storage yard and has also been used to temporarily store newly purchased chemicals. The DR-14 area was identified on 3 of the 48 aerial photographs supplied by EPA. Building 202 consists of 6 storage bays with a concrete floor, and is covered with a noncombustible roof. One of the center bays is used for the storage of safety gear; the remaining 5 bays are generally used for the storage of hazardous wastes in 55-gallon drums. The hazardous waste storage bays are separated from each other by concrete block walls and the floor of each bay is sloped from front to rear to contain more than 10 percent of the volume of maximum container storage. A concrete staging apron is installed in front of the Building 202 bays to keep any potentially leaking or spilled liquid waste away from the storm drain in the storage yard. Since 1983, all solvent wastes and surplus solvents have been collected in 55 gallon drums and have been temporarily stored in Building 202 to be prepared for transportation and subsequent management offsite.

In addition to Building 202, a diked (curb-containment) concrete pad is located in Area DR-14 (hazardous waste storage yard) approximately 20 feet northwest of Building 202. This pad has been used for 55-gallon drums that are empty or contain small residual quantities of chemicals that are held in temporary storage until they can be returned to the vendor. The pad is designed to hold 12 drums and has secondary containment for approximately 20 gallons of liquid.

B.2.15 Drum Storage Area DR-15

Drum storage area DR-15 (Plate 4) was identified by the EPA in the southwestern AISA west of the Special West Area and west of the western railroad spur. The DR-15 area was identified on 2 of the 48 aerial photographs provided by EPA (EPA Prints 37 and 39, 1968 and 1971), and consists of 2 separate areas. Neither print shows the presence of drums; the objects shown in this area appear too large to be drums. No documentation was found regarding storage of drums, equipment, and/or machinery in this area by Aerojet or others during the period from 1968 to 1971. No information was found regarding potential chemicals stored in this area.

B.2.16 Drum Storage Area DR-16

Drum storage area DR-16 (Plate 4) was identified by the EPA in three small locations in the southwestern AISA on the east side of the former Reichhold Chemical building. The DR-16 area was identified on 2 of the 48 aerial photographs provided by

EPA (EPA Print Nos. 45 and 46, 1983 and 1985). Aerojet no longer occupied this area in 1983. The 1985 photograph shows the presence of numerous drums (and equipment/machinery) in this area. No documentation was found regarding chemical products stored in these drums. However, information provided by Reichhold Chemical to EPA indicates wastes produced at the Reichhold facility included TCE, other halogenated aliphatics and aromatics, acrylates, latex emulsions, amides, amines, imides, resins, "solvents-protic," "solvents-nonprotic," esters, ethers, alcohols, ketones, aldehydes, and wastes with flash points below 100°F. Reported chemicals spilled at the site in quantities greater than 5 gallons include at least alkyd resin, polyester resin, coconut oil, "polyester line clear," styrene, butyl acetate, and methyl methacrylate.

B.2.17 Drum Storage Area DR-17

Drum storage area DR-17 (Plate 4) was identified by the EPA in two locations in the southwestern AISA on the west and south sides of the Reichhold Chemical building. The DR-17 area was identified on 2 of the 48 aerial photographs provided by EPA (EPA Prints 45 and 46, 1983 and 1985). Aerojet no longer occupied this area in 1983. The 1985 photograph shows the presence of numerous drums this in area. No documentation was found regarding chemicals stored in these drums. However, information provided by Reichhold Chemical to EPA indicates wastes listed above (DR-16) were produced at the Reichhold facility.

B.2.18 Drum Storage Area DR-18

Drum storage area DR-18 (Plate 4) was identified by the EPA in the southwestern AISA on the north side of Building 190. The DR-18 area was identified on 2 of the 48 aerial photographs provided by EPA (EPA Prints 45 and 46, 1983 and 1985). Aerojet no longer occupied this area in 1983. The 1985 print is unclear but may indicate the presence of drums in this area. No information was found regarding chemical products stored in these possible drums. However, information provided by Reichhold Chemical to EPA indicates wastes listed above (see DR-16) were produced at the Reichhold facility.

B.2.19 Drum Storage Area DR-19

Drum storage area DR-19 (Plate 4) was identified by the EPA in the western AISA, east of the western railroad spur on property previously owned by E.K. Metzner. The DR-19 area was identified on 1 of the 48 aerial photographs provided by EPA (EPA Prints 41, 1975). It is unclear if this photographic print indicates the presence of drums in the DR-19 Area. No documentation was found regarding storage of drums, equipment, and/or machinery in this area. No documentation was found regarding chemicals potentially stored in this area.

B.2.20 Drum Storage Area DR-20

Drum storage area DR-20 (Plate 4) was identified by the EPA in the western AISA, along the eastern side of the western railroad spur on property previously owned by E.K. Metzner. The DR-20 area was identified on 1 of the 48 aerial photographic prints provided by EPA (EPA Print 41, 1975). It is unclear if this photograph indicates the presence of drums in the DR-20 area. No documentation was found regarding storage of drums, equipment, and/or machinery in this area. No documentation was found regarding potential chemicals stored in this area.

B.2.21 Possible Drum Storage Area DR-21

Possible drum storage area DR-21 (Plate 4 was identified by the EPA in the western AISA, along the eastern edge of the western railroad spur on property previously owned by E.K. Metzner. The DR-21 area was identified on 1 of the

48 aerial photographic prints provided by EPA (EPA Print 41, 1975). Print 41 may indicate the presence of drums in the DR-21 area. No documentation was found regarding storage of drums, equipment, and/or machinery in this area. No documentation was found regarding potential chemical products stored in this area.

B.2.22 Drum Storage Area DR-22

Drum storage area DR-22 (Plate 4) was located in Aerojet Area 3 (*Aerojet, 1988*, 104(e), page 27, Attachment A), in the area of currently existing Building 178. Area DR-22 was in use from approximately 1954 to 1963 as a salvage yard. The DR-22 area was identified on 8 of the 48 aerial photographs provided by EPA. However, no drums are recognizable in any of the prints provided by EPA. From 1955 to 1963, containers of PCE waste and TCE waste may have been stored in the salvage yard with other solvent waste to await transfer offsite for reclamation or disposal (*Aerojet, 1988*, 3007/104(e), pages 29 and 31). Salvage yard operations were moved in 1963 to Aerojet Area 3A (see DR-23).

B.2.23 Drum Storage Area DR-23

Drum storage area DR-23 (Plate 4) was located in Aerojet Area 3A (*Aerojet, 1988*, 104(e), page 27, Attachment A), at the location of former Building 166. Area DR-23 (the rebuilt salvage yard) was in use from approximately 1963 to 1970. The DR-23 area was identified on 9 of the 48 aerial photographic prints provided by EPA. No drums are recognizable in any of the photographic prints provided by EPA. From 1963 to 1970, containers of PCE waste and TCE waste may have been stored in the salvage yard with other solvent waste to await transfer offsite for reclamation or disposal (*Aerojet, 1988*, 3007/104(e) pages 29 and 31).

B.2.24 Drum Storage Area DR-24

Drum storage area DR-24 (Plate 4) was identified by the EPA in the southwestern AISA, west of the Special West Area and just east of the western railroad spur. The DR-24 area was identified on 4 of the 48 aerial photographic prints provided by EPA. None of the photographs show the presence of drums; the objects shown in this area appear too large to be drums. No documentation was found regarding storage of drums, equipment, and/or machinery in this area by Aerojet or others during the period from 1968 to 1972. No documentation was found regarding potential chemical products stored in this area.

B.2.25 Drum Storage Areas DR-25 a through d

Drum storage areas DR-25 a through d (Plate 4), unidentified in the *SOW*, are in the four locations identified as Aerojet Area 10 (*Aerojet, 1988*, 104(e), page 28, Attachment B), adjacent to Buildings 53, 146, 183, and 194 respectively. These areas, built in 1983, have concrete block walls, concrete slab floors, and open-sided metal roofs. They have been used since 1983 as local drum collection stations for in-process chemical wastes.

B.2.26 Drum Storage Area DR-26

Drum storage area DR-26 (Plate 4), unidentified in the *SOW*, is located in the western portion of the AISA, at the former location of Ioptex Research, Inc. (Ioptex). The former Ioptex building (Building 119) is identified on the 1987 and 1988 photographs, Nos. 47 and 48. Although no drums are visible in these photographs, information provided by Ioptex to EPA (letter dated January 25, 1988) indicates that waste materials produced at this facility are stored in 55-gallon drums "outside the back dock area." Chemicals reportedly used at Ioptex during 1987 include methanol, methylene chloride, acetone, Freon 113, isoproyl alcohol, methyl methacrylate, ethyl methacrylate, ethyl acrylate, carbon tetrachloride, and sodium hydroxide. Wastes produced at Ioptex during 1987 include methanol, methylene chloride, acetone, trichlorotrifluoroethane (Freon 113), isopropyl alcohol and sodium hydroxide. The total amount of waste generated during 1987 was reported to be 1,400 gallons. The current Ioptex facility is located on Santos Diaz Avenue in the southwestern AISA area (Plate 4).

B.2.27 Drum Storage Area DR-27

Drum storage area DR-27 (Plate 4), unidentified in the *SOW*, was located in the south-central portion of the AISA, at former Building 27. Drums were visible at Building 27 on 2 of the 48 photographic prints provided by EPA (EPA Print 6 and 7, both 1950). Based on the double-high stacking of the drums, it is likely that the drums visible on Print 6 were empty. Building 27 was constructed in the 1940s and demolished in 1960. The building was designated for storage for particular specific operations (*Aerojet, 1988*, 104(e), page 26) and was located north of the Proving Grounds. No documentation was found regarding the types of product(s) stored in this area.

B.3 Sumps

Two sumps (the JPC sump and S-1) have been identified within the AISA boundary. As discussed in Section 1.1.4.2.13, the JPC sump is being investigated separately, under Los Angeles County sump closure regulations. Sump S-1, as identified in the *SOW*, is located at the ORC facility along the south side of former Building 159 (Plate 4). As reported in the *SOW*, sump S-1 was in use from 1972 to 1977. No additional information regarding this sump, which was installed and used by ORC, has been found. However, ORC responses to EPA 3007/104(e) information requests state that ORC used organic chemicals including 1,1,1-TCA, methylene chloride, trichlorotrifluoroethane (Freon 113), methyl chloride, acetone, methyl methacrylate, and "CR-39" polymer. The responses also indicated that ORC conducted plating operations with nickel, chrome, copper, and rhodium.

B.4 Fuel, Oil, Solvent, And Waste Storage Tanks

Nine storage tank locations have been identified within the boundary of the AISA. Based on 3007/104(e) response documentation, Tanks 1a, 1b, and 2 through 5 have been identified as potential source areas, as described in Section 1.1.6.4. On the basis of material storage and tank integrity testing data, Tanks 6 through 8 are not identified as potential source areas.

The following section describes the location and uses of above grade and below grade storage tanks that were used for the storage of fuels, oils, solvents and waste fluids.

B.4.1 Storage Tanks T-1a and T-1b

An aboveground storage tank, designated Tank T-1a (Plate 4) by EPA, was identified in the *SOW* in the north-central AISA, just west of Building 136. This tank was visible on 26 of the 48 aerial photographs provided by the EPA, and was described in the *SOW* as a 5,000-gallon above-grade TCE storage tank. However, this tank was only used as a fuel oil storage tank for gravity feed to the boiler unit in Building 136. Fuel oil purchased offsite was delivered to the site in tanker trucks and the product was loaded into this tank, designated here as Tank T-1a. The period of use ran from pre-1947 through approximately 1966. Tank T-1a was an aboveground, horizontal cylindrical tank supported on concrete saddles. A concrete wall around the tank provided secondary containment (*Aerojet, 1988*, 104(e), page 76).

A second 5,000-gallon capacity above ground storage tank, not identified in the *SOW*, existed near T-1a adjacent to Building 136 from 1957 through 1966. This tank was an aboveground, vertical cylindrical steel tank, designated here as Tank T-1b (*Aerojet, 1988*, 104(e), page 76, *Aerojet, 1983*, 104(e), page 26). The tank was intended to store TCE. However, available information indicates that this tank was never used to store TCE or any other chemicals.

B.4.2 Storage Tank T-2

Underground storage Tank T-2 (Aerojet Tank Location No. 29) was identified in the *SOW* in the north-central AISA, at the north end of Building 200 (Plate 4). Tank T-2 was not identified on any of the 48 aerial photographic prints provided by EPA. The tank was a cylindrical steel unit with a capacity of 1,000 gallons that was used to store rinse water from the laboratory in Building 200. Tank T-2 was in use from 1968 to 1982, when it was removed. Rinse water from the building's fume hood sink drained by gravity into T-2 and was periodically pumped out for disposal. The fume hood sink was adjacent to an electro-optical sensor assembly area and was used to rinse small (0.5 pint) containers of residual waste solvents. As described above in the summary of previous investigation (Section 1.1.4.2.10), in 1982, the contents of T-2 were sampled and analyzed for solvents; the analyses detected very low average concentrations of methanol (2 ppm), ethyl acetate (3 ppm), butyl acetate (3 ppm), methyl isobutyl ketone (2 ppm), and xylene (20 ppm). No chlorinated solvents were detected. Qualitative tests for the presence of heavy metals and cyanides detected none of those compounds.

B.4.3 Storage Tank T-3

Underground storage Tank T-3 (Aerojet Tank Location 28, also called the heavy metals tank) was identified in the *SOW* in the north-central AISA, at the north side of Building 53 (Plate 4). The tank was not identified on any of the 48 aerial photographs provided by EPA. Tank T-3 was a 1,250-gallon rectangular concrete unit with a plastic liner. The tank was in use from 1972 to 1986 to collect small quantities of gravity-fed liquid wastes from laboratory sinks. The wastes included tin, lead, arsenic, alcohol, and TCE. When the tank was filled, a waste disposal company was contracted to pump out and dispose of the wastes. In 1979, the inlet pipe to the tank was found to be leaking; a description of the resulting investigation and remedial activities performed at Tank T-3 is provided above in the summary of previous investigations in (Section 1.1.4.2.1).

B.4.4 Storage Tank T-4

Underground storage Tank T-4 (Aerojet Tank Location No. 24) was located in the north-central AISA southwest of Building 136 (Plate 4). The tank was not identified on any of the 48 aerial photographs provided by EPA. Tank T-4 was originally a 1,000-gallon capacity cylindrical steel tank used to store gasoline until 1959, when it was replaced with a 10,000-gallon cylindrical steel tank. In 1971, the 10,000-gallon tank was relocated to Aerojet Tank Location No. 25, north of Building 322 (see T-5).

B.4.5 Storage Tank T-5

Underground storage Tank T-5 (Aerojet Tank Location No. 25) was located in the central AISA, north of Building 322 (Plate 4). Tank T-5 was not identified on any of the 48 aerial photographs provided by EPA. Tank T-5 was the relocated Tank T-4 from Tank Location 24, described above as a 10,000-gallon capacity cylindrical steel tank. The tank was replaced in 1971. The new 10,000 gallon tank, which was coated with an asphalt-base paint, remained in service until June 1991, when it was removed from service and excavated. This tank was routinely pressure tested and monitored for leaks as discussed above in the summary of previous investigations. Ongoing monitoring of the tank prior to removal indicated that the tank had not leaked. Results of the tank closure investigation will be provided when available. In addition, 1985 closure investigations conducted for the removal of nearby tanks T-6 and T-7 indicated that the area around those tanks and near Tank T-5 did not contain chemicals.

B.4.6 Storage Tank T-6

Underground storage Tank T-6 (Aerojet Tank Location No. 26) was located in the central AISA, north of Building 322 (Plate 4). Tank T-6 was not identified on any of the 48 aerial photographs provided by EPA. This was a 280-gallon capacity cylindrical black iron tank used to store fresh motor oil for the lubricating of onsite motor vehicles until 1985 when it was removed, as described above in the summary of previous investigations. No contamination was found when the tank was removed.

B.4.7 Storage Tank T-7

Underground storage Tank T-7 (Aerojet Tank Location No. 27) was located in the central AISA, north of Building 322 (Plate 4). Tank T-7 was not identified on any of the 48 aerial photographs provided by EPA. Tank T-7 was a 550-gallon capacity cylindrical tank used to store used motor oil from onsite motor vehicles until 1985 when it was removed, as described above in the summary of previous investigations. No contamination was found when the tank was removed.

B.4.8 Storage Tank T-8

Underground storage Tank T-8 (Aerojet Tank Location No. 30) was located in the west-central AISA, northwest of Building 163 (Plate 4). Tank T-8 was not identified on any of the 48 aerial photographs provided by EPA. This tank was a 6,000-gallon capacity cylindrical steel tank with exterior coating used to store gasoline for fueling onsite motor vehicles until May 1989, when it was removed and replaced with a new double-contained, 5,000-gallon fuel tank. A tank closure investigation performed in May 1989 for the 6,000-gallon tank indicated that the tank had not leaked and the Los Angeles County Department of Public Works issued a Hazardous Material Underground Storage Closure Certification (No. 5600B) on January 15, 1991, indicating that no further work was required at the site.

B.5 Waste Disposal Areas

Evidence of the waste disposal areas, as identified by the EPA in the *SOW*, was drawn from EPA interpretation of historical aerial photographs. Four waste disposal areas (WD-1 through WD-4) were identified by the EPA within the boundaries of the AISA. On the basis of subsequent review of aerial photographic prints and the Aerojet 3007/104(e) response documentation, only WD-1 has been confirmed as a potential source area. Waste disposal areas WD-2 through WD-4 have not been confirmed as potential source locations. On the basis of the aerial photographic prints and 3007/104(e) response reviews, areas WD-2 through WD-4 contained either bushes, agricultural materials, or activities associated with vehicle parking. The photographs indicate some surface soil disturbance. However aerial photographic prints provided by EPA do not indicate that waste disposal actually occurred in the areas identified by the EPA. The following subsections describe the four locations identified by EPA, the time periods that the visible activities are observed, and the apparent nature of the activities in the area.

B.5.1 Waste Disposal Area WD-1

Waste Disposal Area WD-1 (Plate 4), as identified by EPA, was in the north central portion of the site, based on EPA's interpretation of the EMSL 1945 aerial photograph. Early in Aerojet Engineering Company's history (circa 1945) the northern portion of the site was used as a rocket test area (*Aerojet, 1988*, 104(e), page 24). This rocket test area was located in the vicinity of Building 119 in the north-central portion of the site. From the 1945 aerial photographic print it appears that the area identified by the EPA as a waste disposal area is actually the rocket motor testing area. The 1945 photograph indicates that a berm of soil was present along the northern boundary of WD-1, apparently to control exhaust from the rocket motors, not for waste disposal.

The 1945 aerial photographic print was the only photograph of the 48 reviewed where WD-1 was identified (Table 7). The surface dimensions of the feature identified in this work plan as WD-1 were approximately 250 feet (north-south) by 120 feet (east-west). By 1947, Building 119 had been constructed in the WD-1 area and all rocket motor testing was being performed in the Proving Grounds.

B.5.2 Waste Disposal Area WD-2

The WD-2 area, as identified by EPA, was in the northeast portion of the site, based on EPA's interpretation of the EMSL June 1954 aerial photograph (Print 18). Area WD-2 was paved in 1955, as shown in the Aerojet aerial photograph dated December 1955. The aerial photographic prints subsequent to 1954 and the AISA Plot Plan for the period between 1955 and 1960 (Plate A-1) indicate that this area was used as a parking area. In addition, small structures observed in the aerial photographs are reported to be stored weather station shelter boxes and not disposed materials. It appears that soil disturbances observed in the 1954 aerial photograph are probably associated with parking area and weather station storage activities conducted prior to paving, and not with waste disposal activities.

The features observed on Print 18 are also observd in ten other aerial photographs (Table 7). The surface dimensions of the feature identified in this work plan as WD-2 were approximately 320 feet (north-south) by 230 feet (east-west).

B.5.3 Waste Disposal Area WD-3

The WD-3 area (Plate 4), as identified by EPA, was immediately south of the burn area, based on EPA's interpretation of the EMSL 1954 aerial photograph. An unpaved road leads to WD-3 from the west and a turnabout in the unpaved road is observed immediately west of WD-3. This area is on the top edge of the open pit (the "Kincaid" pit) immediately above the burn area where waste solid propellants were burned (see Section B.6). WD-3 area identified in the *SOW* is apparently a clump of vegetation or bush, encircled by the unpaved road. The road was used as an access and observation area for the fire truck that always stood by during waste fuel burns in the burn pit, and not for waste disposal. No other anomalous features are observed in this area. The feature is clearly distinguishable in Aerojet's aerial photographic print dated December 1963.

The open pit was leased from the Consolidated Rock Company in 1947. During burning of waste solid propellant, an Aerojet fire truck was present to control the burn (*Aerojet, 1983*, 104(e), Exhibit 7, page 1). Approximately 100 gallons of water were sprayed on the burn area after burning of the solid propellant was completed. This fire monitoring and final spraying of the burn area took place from the road loop described above, because of the intensity of the fires.

Similar features to those observed in the 1954 aerial photographic print in the area identified by EPA as Waste Disposal Area WD-3 were also observed in 12 other aerial photographs (of the 48 total reviewed). These other aerial photographs confirm that the feature identified as WD-3 from the 1954 aerial photograph is simply a bush surrounded by a dirt road turnabout for fire truck access. The surface dimensions of the feature (including the bush and turnabout) identified in this work plan as WD-3 were approximately 80 feet (east-west) by 60 feet (north-south).

B.5.4 Waste Disposal Area WD-4

The WD-4 area (Plate 4), as identified by EPA, was located in the northwest portion of the AISA (Plate 4). This property was previously owned by E.K. Metzner and was sold to the Irwindale Community Redevelopment Agency (CRA) in 1987. The WD-4 area can be seen on 4 of the 48 aerial photographic prints provided by EPA (Table 7). Aerojet's August 1951 aerial photograph was the first aerial photograph where soil disturbance was observed in the area of WD-4. The last aerial photograph where the soil disturbance is observed in the area of WD-4 is the EMSL aerial photograph dated June 7, 1954. The Aerojet aerial photograph dated March 1951 shows large stockpiles of a dark material. These stockpiles appear to be associated with the fertilizer/agricultural product processing operations later located approximately 300 feet east of WD-4 between 1957 and 1971 (see Section 1.1.6.8.4). Subsequent aerial photographs show that the stockpiles have been reworked and/or removed, and that eventually a more complex fertilizer/agricultural product processing facility was built in the area, where visually similar stockpiles of agricultural products continued to be used.

The surface dimensions of the soil disturbance identified in this work plan as WD-4 were approximately 400 feet (north-south) by 120 feet (east-west).

B.6 Burn Area

Solid propellant waste was disposed by burning in a small area of an open pit that was leased from the Consolidated Rock Company in 1947 (the "Kincaid" pit), and was located northwest of the Aerojet Azusa facility and north of the railroad. The BA-1 area (Plate 4) was identified on 6 of the 48 photographic prints provided by EPA, and was operated from 1947 until 1965, when solid propellant experimental programs were terminated at the Azusa facility. Available documentation indicates that the pit was also used by the Dameral-Allison Company of Covina, California, to dispose of juicing-plant citrus peels and other citrus wastes.

Solid propellant wastes (composed of asphalt or fuel oil and perchlorate oxidizers) were collected by Aerojet and taken to the pit for burning. The solid propellant burned with such intensity that only a few minutes were required to consume the entire pile. Approximately 100 gallons of water were sprayed on the remaining dust to quench any smoldering pieces. The propellant was ignited at approximately 5:00 am in the morning, and the residue was cleaned up following burning activities. In 1949, the Los Angeles District Attorney's office asked for a hearing on the issue of potential solid propellant pollution at Aerojet. The Los Angeles Air Pollution Control District had issued a permit to allow Aerojet to burn propellant with a restriction that amounts would be limited to 1,200 pounds per day, that the burn not exceed 5 minutes, and that Aerojet track the resultant cloud.

In 1950, consideration was given to disposing of the propellant waste in the desert area of San Bernardino. This proposal was abandoned because the material was too combustible to merit being regularly hauled over public highways. It was the conclusion of all parties that no real industrial waste or air pollution problem existed as long as Aerojet met the restrictions of quantity, time, and cloud tracking described above. In 1967, the Kincaid pit was sold to the State of California by the Consolidated Rock Company, and in 1968 the pit and surrounding area were graded for the construction of Interstate 210 (*Aerojet, 1983*, 104(e) pages 14 and 17, and Exhibit 7). On the basis of historic data, burn area BA-1 has been identified as a potential source area.

B.7 Ring Channels

Two concrete ring channels have been used on the Aerojet facility. Both ring channels were located in the eastern portion of the Aerojet facility (Plate 4). The smaller and larger ring channels were observed on 27 and 31, respectively, of the 48 aerial photographs reviewed (Table 7). The outside diameters of the two ring channels were approximately 55 and 120 feet and the inside diameters were 40 and 70 feet, respectively. The space between the outer and inner rings was filled with water. These concrete tanks were towing tanks used to test the shapes and hydrodynamic efficiencies of various hull designs and for other underwater mechanical engineering testing (*Aerojet, 1983*, 104(e), Exhibit 1, page 25). Only physical tests were performed inside the ring channels; no chemical testing occurred within these structures.

The smaller easternmost ring channel (R-1a) was installed before 1945. Aerial photographs indicate that this ring channel was demolished and removed between February 1966 and September 24, 1968. The larger westernmost ring channel (R-1b) was constructed in approximately 1947 and demolished and/or removed between March 1971 and October 24, 1975.

B.8 Stain and Liquid Areas

Six stained and liquid areas (SL-1 through SL-6) were identified by the EPA within the boundaries of the AISA based on interpretation of historical aerial photographs. On the basis of aerial photographs review and the Aerojet 3007/104(e) response documentation, and as described in Section B.8, SL-1, SL-5 and SL-6 have been identified as potential source locations. Aerial photographic prints and the 3007/104(e) response reviews indicate that areas SL-2 and SL-3 appear to be caused by draining of swamp cooler water from the roofs of the corresponding buildings. However, at the request of the EPA/RWQCB, SL-2 and SL-3 have also been incorporated into the AISA Site Assessment. The following sub-sections describe the stain and liquid areas identified by EPA, the time periods that these areas are observed in aerial photographs, and the potential activities in the areas (if known).

B.8.1 Stain and Liquid Area SL-1

The Stain and Liquid Area SL-1 (Plate 4), as identified by EPA, was located in the southern portion of the site. SL-1 was observed in 30 of the 48 aerial photographs provided by EPA (Table 7). The surface dimensions of the feature identified as SL-1 were approximately 700 feet (east-west) by between 80 and 180 feet (north-south). This area was immediately south of the buildings in the Proving Grounds. The principal buildings in the Proving Grounds were liquid and solid propellant test bays, fuel and material storage buildings, machine shops and laboratories, and associated offices and other facilities (*Aerojet, 1988*, 104(e) response, page 21) related to the testing of rocket motors and other equipment.

During rocket motor test firings, large quantities of water were used to prevent the concrete aprons from cracking and to wash away the products of combustion and/or residual fuel and/or oxidizer. The wastewater was drained to basin B-1 via drainage channel course DG-1 from SL-1 until 1952. In 1952, discharge from the Proving Grounds operations was contained and diverted via a concrete-lined drainage channel, to the industrial waste treatment facility (IWTF) for treatment before being discharged to the Irwindale industrial waste sewer system. Liquid wastes from the Proving Grounds operations potentially included: aniline, xylidine, JP-3, hydrazine hydrate, organic sludges, nitric acid, nitrates, kerosene, and other petroleum derivatives (*Aerojet, 1983,* 104(e) response, Exhibit 1, page 170). The total amount of liquid used during the rocket motor testing per day was as much as 20,000 gallons (*Aerojet, 1983,* 104(e) response, Exhibit 1, page 106). As noted above, almost all of this liquid was cooling and wash water associated with the rocket motor testing. Soot staining has been observed immediately south of the test bays in Buildings 19, 23, 74, and 156 (Plate 4). These individual stained locations are likely soot resulting from rocket motor testing operations.

Some rainwater runoff and industrial wastes were also drained to SL-1 before installation of the IWTF in 1952. Industrial waste, during the period before 1952, was drained to an industrial waste collection ditch adjacent to Building 26 at the northeast corner of SL-1. Ponded liquid is observed in two 1950 aerial photographs showing this portion of SL-1 (Prints 5 and 6).

Following the installation of the IWTF in 1952, wastewater from the Proving Grounds was collected for treatment at the IWTF. The IWTF also collected and treated industrial wastewater drained from other areas within the Aerojet facility (*Aerojet, 1983*, 104(e) response, Exhibit 1).

By 1958 only small-scale rocket motor testing was conducted in the Proving Grounds because most of the rocket motor testing program had been transferred to Sacramento, California. In 1968, all rocket motor testing was eliminated from Aerojet's Azusa facility and demolition of the Proving Grounds began. By 1972, the Proving Grounds buildings were demolished and by 1975 the area was converted to a parking area.

Mercury was observed in 1971 in areas within Buildings 180, 187 and 156 where equipment was being removed and cleaned up. Analysis of water samples from a ditch in the SL-1 area south of these buildings indicated elevated levels of mercury. This area was cleaned and resampled, and the concentrations of mercury in the post-cleanup drainage water samples were below allowable limits (*Aerojet, 1988*, 104(e) response, page 99).

B.8.2 Stain and Liquid Area SL-2

SL-2, as identified by EPA, was in the northeast portion of the site (Plate 4). This area was shown in 11 of the 48 aerial photographs provided by EPA. The surface dimensions of the feature identified as SL-2 were approximately 750 feet (east-west) by between 10 and 30 feet (north-south).

SL-2 is first observed in the first aerial photograph of Building 119, taken on October 9, 1947. SL-2 is observed in subsequent aerial photographs until approximately August 20, 1959. Staining observed in the aerial photographs is associated with the roof drains of Building 119 (Aerojet's aerial photograph dated August 1951). The roof of Building 119 also appears to be mottled in the aerial photographs prior to June 17, 1954. Swamp coolers (and soaker hoses) were known to have been used at the site during the 1940s and 1950s and the drainage water from such cooling systems at Building 119 is likely to have caused the Area SL-2. By January 1963, the roof of Building 119 had a different ventilation/air cooling system. This is consistent with the disappearance of apparent staining after 1959.

B.8.3 Stain and Liquid Area SL-3

SL-3, as identified by EPA, was in the central portion of the site immediately adjacent to the historical boundaries of Building 116 (Plate 4). This area was shown in

11 of the 48 aerial photographic prints provided by EPA. The surface dimensions of the feature identified in this work plan as SL-3 were approximately 300 feet (east-west) by 50 feet (north-south).

Area SL-3 is first observed in the first aerial photograph of Building 116, taken in October 9, 1947. Initially, Building 116 consisted of two unattached buildings. The easternmost building had a distinctly different air cooling system than the westernmost building, as evidenced by the greater number of vents on the roof of the easternmost building. During this time period the stain and liquid areas of SL-3 were mainly associated with the roof drains from the easternmost building (Building 116). The roof of the easternmost Building 116 also appears to be mottled in the aerial photographs prior to August 1951. By September 1952 the eastern and western Buildings 116 were connected and a new roof system was installed. After this period the stain and liquid areas were observed in association with the roof drains from both the eastern and western portions of the building. By January 1963, the roof of Building 116 again had a different ventilation/air cooling system. Swamp coolers (and soaker hoses) are known to have been used at the site during the 1940s and 1950s and the drainage water from such cooling systems at Building 116 is likely to have caused the Stain and Liquid Area SL-3.

B.8.4 Stain and Liquid Area SL-4

SL-4, as identified by EPA, was in the western portion of the site (Plate 4). This area was identified in 13 of the 48 aerial photographic prints provided by EPA. EPA identified 3 specific and distinct locations for SL-4. These three areas are referred to in this work plan as SL-4a, SL-4b and SL-4c (see Plate 4 for locations of these stain and liquid areas). The surface dimensions of SL-4a were approximately

80 feet (east-west) by 70 feet (north-south). Both SL-4b and SL-4c were approximately 30 feet square.

SL-4a appears to consist of a stockpile of dark material (grape and citrus waste) associated with the fertilizer/agricultural product processing facility and was not liquid. The fertilizer/agricultural product facility was present at the SL-4 area between 1957 and 1971. This property was owned by E.K. Metzner until it was sold to CRA in 1987. The stockpiled material is clearly shown in Aerojet's December 1963 aerial photograph (*Aerojet, 1988*, 104(e) response, Question 15, Attachment A, page 14). Stain and Liquid Areas SL-4b and SL-4c are the outdoor processing plants associated with the processing equipment.

B.8.5 Stain and Liquid Area SL-5

SL-5, as identified by EPA, is located in the far western portion of the site (Plate 4). Aerojet leased this property was leased from E.K Metzner in 1961 and purchased it from E.K. Metzner in 1967. This area was identified in 6 of the 48 aerial photographic prints provided by EPA. The surface dimensions of the feature identified as SL-5 were approximately 150 feet (north-south) by 15 feet (east-west). SL-5 consists of a small drainage originating from Building 189. The first aerial photograph that shows the SL-5 feature is the EMSL September 24, 1968, photograph. The EMSL February 14, 1985, aerial photograph is the most recent photograph that shows SL-5. Up to 1976, Building 189 was used as a glass bead melting laboratory; however, Aerojet's control of this building was transferred to Kaiser Glass Fibers in 1970. The property surrounding SL-5 was leased and purchased by Reichhold Chemical, Inc. in 1976 and 1979, respectively. Information provided by Reichhold to EPA indicates wastes produced at their facility included (in 1988) TCE, other halogenated aliphatics and aromatics, acrylates, latex emulsions, amides, amines, imides, resins, "solvents-protic," "solvents-nonprotic," esters, alcohols, ketones, aldehydes, and wastes with flash points below 100°F. Reported chemicals spilled at the site in quantities greater than 5 gallons include alkyd resin, polyester resin, coconut oil, "polyester line clear," styrene, butyl acetate, and methyl methacrylate.

B.8.6 Stain and Liquid Area SL-6

SL-6, as identified by EPA, is located in the west-central portion of the site immediately adjacent to the southeast corner of Building 159 (Plate 4). This area was identified in only 1 of the 48 aerial photographic prints provided by EPA, and SL-6 was approximately 15 feet square. Based on the one aerial photograph that showed this stained surface, the staining probably originated from the southeastern corner of ORC Building 159. ORC 3007/104(e) response documentation provided by EPA indicates that ORC uses volatile and semivolatile organics, as well as nickel, copper, chromium, and rhodium.

B.9 Industrial Waste Treatment Systems

In 1949, Aerojet requested a license to connect an industrial waste system to the Irwindale Avenue sewer (referred to as the Polymer Plant Line). As a result, Aerojet was requested to obtain permission from the Water District, the County Sanitation District, and American Cyanamid Co. (*Aerojet, 1983*, 104(e) Exhibit 1).

Continuous negotiations were carried on with various agencies until January 5, 1951, when partial approvals were obtained to start construction. During this time, the design of the system was started, several new buildings were added to the site, and waste lines for the new buildings were included in the system. By November 30, 1951, full approvals had been received, and construction of the industrial waste system was in progress. Industrial wastes were discharged to the Irwindale line starting in April 5, 1952. The final installation included all rocket test bays, the chemical lab, Building 56 and manufacturing facilities, and Building 57. As part of this agreement, Aerojet was asked to monitor the quantity and pH of the waste discharge, and the operating hours the industrial waste system was used. Los Angeles County also made inspections of the industrial waste system (*Aerojet, 1983*, 104(e) Exhibit 1).

On February 1, 1955, a new agreement was made between Aerojet and the County Sanitation District of Los Angeles. A 1955 addition to the in-plant industrial waste disposal system included two laboratory buildings, Buildings 15 and 16. In 1957, the system was extended to include the new plastics building, Building 159. Application was also made to the City of Irwindale, because Building 159 was in the city of Irwindale rather than the city of Azusa. On September 15, 1961, a revised industrial waste permit was received from the County of Los Angeles which included limits for boron and fluoride.

Beginning in the early 1950s, the JATO rocket programs were transferred to the new Aerojet Sacramento plant. By 1958, only small-scale experimental propellant programs were left at the Azusa Facility. By 1968, all rocket programs had either been transferred to other Aerojet facilities or had been eliminated altogether, thus ending the need to treat wastewater from rocket motor testing.

From 1968 through 1971, all structures and equipment identified with the rocket research and development programs were demolished and the materials removed from the site (*Aerojet, 1983*, 104(e) Exhibit 6, Drawings 6 and 7). Starting in 1970, Aerojet Azusa divested itself of several major buildings, which in turn were sold or leased to other companies. In 1970, control of Buildings 189, 190, and 191 was transferred to

Kaiser Glass Fibers. In 1971/72, control of Buildings 159 and 163 was transferred to Optical Radiation Corporation, and Structural Composites Industries, Inc., respectively. In 1973, Building 57 was leased to Debeck Homes, Rainbird Mfg., and Varitronics. In 1976, control of Building 119 was transferred to Howell Inc. and Optical Radiation Corp. (*Aerojet, 1983*, 104(e) Exhibit 6, page 7). The transfer of these major buildings, the change in their operations, and the elimination of the Aerojet Rocket Research Facilities substantially reduced the daily quantity of industrial liquid waste delivered from Aerojet to the waste treatment facility.

In 1970, the Los Angeles County Engineer advised Aerojet that companies now occupying Aerojet's former facilities were still connected to the industrial waste system, so that if any one of these companies were to dispose of unacceptable chemicals into the waste systems, all of the companies connected to that system could be shut down (*Aerojet, 1983*, 104(e) Exhibit 1, page 333).

In 1971, the liquid industrial waste treatment plant was moved to its present location and connected to the existing domestic sewer line in Azusa. Only rinse waters were being sent to the industrial treatment unit, because of Aerojet policy prohibiting chemical disposal into drains (*Aerojet, 1983*, 104 (e) Exhibit 1).

On the basis of these data, the IWTF locations have been identified as potential source areas. A description of each facility is provided below.

B.9.1 Industrial Waste Treatment System WT-1

WT-1 was located in the south-southwest portion of the AISA, adjacent to Building 185, at the western edge of the Proving Grounds (Plate 4). The WT-1 facility is visible on 18 of the 48 photographic prints provided by EPA. WT-1 received wastewater from rocket test bays, chemical laboratories, manufacturing and plating facilities and plastics operations. The WT-1 facility was in operation from 1952 to 1971, and consisted of two aboveground redwood influent holding tanks (50,000 and 10,000 gallon) on reinforced concrete tank foundations, a 100 gpm capacity waste treatment plant (including two 500-gallon sodium hydroxide storage tanks, an 80-gallon mixing tank, and a "colloidair" separator), a pump pit, and a sludge pit. Wastes collected at WT-1 included analine, xyladine, alcohols, gasoline, kerosene, hydrazine hydrate, organic sludge, detergents, small quantities of organic salts, mineral acids, inorganic bases and salts, and water. In 1961, maximum discharge concentration limits included total dissolved solids (1,000 ppm), chloride (250 ppm), chloride plus sulfate (500 ppm), nitrate (45 ppm), hexavalent chromium (0.05 ppm), boron (2 ppm), and fluoride (1.5 ppm). A 1955 report stated that an estimated 75 percent of the industrial wastewater originated from the Proving Ground area and the chemical laboratories, while the remainder was contributed by the metal parts manufacturing operations (*Aerojet, 1983*, 104(e), Exhibit 1, pages 154-160, and 265). In 1971, the industrial waste treatment operation was relocated to new facilities adjacent to Building 164.

B.9.2 Industrial Waste Treatment System WT-2

WT-2 is in the south-central portion of the AISA adjacent to Building 164 (Plate 4), and is visible on 8 of the 48 aerial photographic prints provided by EPA. The WT-2 facility has been in operation from 1971 to present, conducting essentially the same operations as were conducted at WT-1. However, upon treatment system relocation from WT-1 to WT-2, an acid treatment unit was added to the facility, along with a fire control system that includes several pumps and a 150,000-gallon firewater holding tank (*Aerojet, 1983*, 104(e), Exhibit 1, pages 337-339, and Drawing 25).

B.10 Ponded Liquid Areas

Evidence for areas that might have contained ponded liquids, identified by the EPA in the 1991 *SOW*, was drawn from EPA interpretations of historical aerial photographs. Five ponded liquid areas (PL-1 through PL-5) have been identified by the EPA within the boundaries of the AISA. Based on subsequent review of aerial photographic prints and the Aerojet 3007/104 (e) response documentation, areas PL-3 and PL-4 have been eliminated as potential source locations. The following subsections describe potential ponded liquid areas identified by EPA, the time periods during which these areas were visible on aerial photographs, and the potential activities in the areas (if known).

B.10.1 Ponded Liquid Area PL-1

Ponded Liquid Area PL-1, as identified by EPA, was near the ring channel RC-1a area immediately adjacent to Building 65 (see Section B.7) (Plate 4). Building 65 is identified as a machine shop/tool crib (*Aerojet*, 1983, 104 (e), Exhibit 6) The Aerojet aerial photograph dated October 9, 1947, is the first photograph in which PL-1 is seen. The area is seen in 13 subsequent aerial photographs (Table 7). The last aerial photograph where PL-1 is shown is dated September 1954. Aerial photographs of the Aerojet facility after 1954 show that PL-1 had been regraded by 1955 and that by 1965, PL-1 was paved and temporary buildings were placed over the former PL-1 location. In 1967, Building 200 was constructed over the former PL-1 location. The surface dimensions of PL-1, as shown in the aerial photographs, were approximately 30 feet (east-west) by 25 feet (north-south). No specific information about the chemical content of PL-1 is available, but it likely received drainage from the machine shop in Building 65. Therefore, it may have received volatile organics and metals from the machine shop, but the metals would have been in the form of macroscopic particles that would not have been significantly mobile below the ground surface.

B.10.2 Ponded Liquid Area PL-2

Ponded Liquid Area PL-2, as identified by EPA, was west of the Special West Area and south of Building 301. The Aerojet aerial photograph dated December 1955 is the first photograph where PL-2 is observed. This was prior to Aerojet occupancy of this portion of the AISA. PL-2 is also identified in 3 subsequent aerial photographs (Table 7). The last aerial photograph where PL-2 is observed is dated February 1966. In 1960, Aerojet leased land from E.K. Metzner that included Ponded Liquid Area PL-2. This property was then purchased from E.K. Metzner by Aerojet. In 1976, the property was sold by Aerojet to Reichhold, and subsequently, buildings have been constructed over the previous PL-2 location. The surface dimensions of PL-2, as shown in the aerial photographs, were approximately 35 feet (east-west) by 25 feet (north-south). No specific information is available about the composition of liquids in PL-2, but the area received drainage from Buildings 301 and 317, testing and laboratory facilities associated with solid propellents. Therefore, PL-2 could have received volatile and semivolatile organics, chlorate, and metals.

B.10.3 Ponded Liquid Area PL-3

Ponded Liquid Area PL-3, as identified by EPA, was in the northwest portion of the AISA (Plate 4). Area PL-3 consists of three visually distinct areas; northern, central, and southern. The Aerojet aerial photograph, dated August 1959, is the first photograph in which PL-3 is observed. PL-3 is also identified in three subsequent aerial photographs (Table 7). The last aerial photograph where PL-3 is seen is dated March 1, 1961. The surface dimensions of the entire PL-3 Area, as shown in the aerial photographs, were approximately 300 feet (north-south) by 80 feet (east-west). The northern and central portions of PL-3 are approximately 80 feet square and the southern portion of PL-3 is approximately 140 feet long (north-south) and 80 feet wide (east-west).

E.K. Metzner owned the land that included PL-3 until 1987. Aerojet leased land that contained the northern and central portions of PL-3 between 1961 and 1970 for use as a parking lot. The starting date of the Aerojet lease is the same approximate date as the last date that PL-3 is seen in aerial photographs. In 1987, E.K. Metzner sold a portion of the property that included the former location of PL-3 to the CRA.

Based on review of the aerial photographs, it appears that the northern portion of PL-3 contains fertilizer/agricultural products similar to those identified in SL-4 rather than ponded liquid. The photographic prints of the discolored northern portion of PL-3 are similar in shading and tone to the stockpiles observed in SL-4. The central and southern portions of PL-3 appear to be scarified soil only, apparently also associated with the fertilizer/agricultural plant activities at the SL-4 area. Specifically, they appear to be areas where stockpiled material has been removed, leaving the soil surface disturbed. Therefore, Area PL-3 is no longer considered a potential source.

B.10.4 Ponded Liquid Area PL-4

Ponded Liquid Area PL-4, as identified by EPA, is in the southeastern portion of the site (Plate 4). PL-4 is seen in 4 of the 48 aerial photographic prints provided by EPA (Table 7). The EMSL aerial photograph dated January 2, 1983, is the first photograph where PL-4 is seen most recently in the January 1988 photograph. The area polygonal, with surface dimensions, as shown in aerial photographs, of approximately 220 feet (east-west) by between 50 and 180 feet (north-south).

Azusa Rock and Sand has owned the property where PL-4 has been identified since the inception of Aerojet's activities in 1942. A portion of this property was leased to Aerojet by Azusa Rock and Sand between 1961 and 1964. This lease period ended prior to first indications of PL-4, as observed by aerial photographs.

The first indications of PL-4 are in the January 3, 1983, aerial photographic print, which shows an excavation pit at the PL-4 location. Subsequent aerial photographs of this area show a broader excavation in the area that contains the boundaries of PL-4. On the basis of review of the aerial photographs and of site development history, PL-4 only collects surface storm water runoff from the paved parking lot in the southeastern portion of the Aerojet facility via drainage channel DG-2 (see Section B.13.2). Therefore, this area is no longer considered to be a potential source area.

B.10.5 Ponded Liquid Area PL-5

Ponded Liquid Area PL-5 is located in the southwestern portion of the present Aerojet site (Plate 4). PL-5 consists of two distinct areas immediately south and west of Building 310. These areas are also immediately east of the former industrial waste treatment facility WT-1. One portion of PL-5 is approximately 150 feet south of Building 310 and consists of an area of approximately 60 feet long (east-west) and 40 feet wide (north-south). The other portion of PL-5 was observed in the aerial photographs adjacent to the southern and western edges of Building 310. This portion of PL-5 is approximately 40 feet wide and extends a cumulative length of approximately 300 feet. Ponded Liquid Area PL-5 was identified in 4 of the total 48 aerial photographic prints reviewed for this work plan (Table 7).

PL-5 was initially observed in the aerial photograph dated May 1950. The aerial photograph dated May 1950, and is identified in three subsequent aerial photographs (Table 7). The most recent aerial photograph where HLA identified PL-5 is dated December 1955. No specific information is available about the composition of liquids in PL-5, but buildings in the area were used for storage of fuels and chemicals, waste treatment, and rocket motor testing. Therefore, PL-5 could have received volatile and semivolatile organics, dioxins/furons, chlorate, and metals.

B.11 Leach Beds

Four leach bed locations (LB-1 through LB-4) have been identified by the EPA within the boundaries of the AISA. On the basis of the review of aerial photographs and the Aerojet 3007/104(e) response documentation, all 4 leach bed locations have been identified as potential source locations. Onsite and offsite leach beds have been used for the temporary storage, treatment (by evaporation), and disposal (by percolation) of wastewaters from various operations at the Aerojet site. Between 1943 and 1952, Leach Beds LB-2 or LB-3 were used to collect wastewater from industrial waste effluents, cooling water from swamp coolers, water drainage from the ring channels, surface water runoff from rainfall, and/or potentially limited amounts of wastewater from rocket test firings. After 1953, the wastewater associated with rocket test firings was collected in a drainage ditch downslope of the test area and then treated at the onsite IWTF. Industrial waste effluent was also treated at this time at the IWTF. An industrial waste disposal permit was issued by the City of Irwindale and the County of Los Angeles to Aerojet in 1961 that established specific criteria for materials discharged to the active leach beds. To ensure compliance with these discharge criteria, a Los Angeles County Engineer regularly sampled the active leach beds (LB-1 and LB-2). In 1970, two (LB-2 and

LB-4) of the remaining three (LB-1, LB-2, and LB-4) active leach beds were covered with clean soil and regraded. The only remaining active leach bed is the one south of the facility (LP-1), which is currently only used to collect and dispose of (via evaporation and percolation) rainwater runoff. The following subsections describe the location, period of operation, and uses of the leach beds.

B.11.1 Leach Bed LB-1

LB-1 is at the southern edge of the Aerojet site immediately south of the Proving Grounds (Plate 4). HLA identified Leach Bed LB-1 on 24 of the 48 aerial photographic prints reviewed for this work plan (Table 7). The surface expression of the leach bed as seen in the photographic prints was approximately 450 feet (east-west direction) by 100 feet (north-south direction).

Leach Bed LB-1 was constructed in 1957 to collect surface water runoff. By that time, industrial wastewater from the Aerojet facility was drained to and treated at Aerojet's onsite IWTF, immediately west of Building 185 (WT-1). Once treated at the IWTF, the industrial wastewater was discharged to the City of Irwindale's industrial wastewater sewer system. Thus, the only types of water collected by Leach Bed LB-1 were "once-through" cooling water, rainwater runoff, and some cooling tower bleed-off water (*Aerojet 1988*, 104(e), page 91). Rainwater runoff piping systems within the Aerojet facility in the late 1960s are described in Aerojet's 1988 104(e) response (Exhibit 2, Drawing 30).

In 1961, engineers from the County of Los Angeles began to collect and analyze water samples from Leach Bed LB-1. The sampling was conducted to ensure that the liquids discharged to the leach beds conformed with Aerojet's industrial waste permit issued on May 19, 1961. The following constituents were analyzed: total dissolved solids, chloride, chloride and sulfate, nitrate, and hexavalent chromium. Measured concentrations of these constituents were below the maximum concentrations allowed to be discharged to the leach beds under the then existing permit. Currently the only source of water to Leach Bed LB-1 is surface water runoff from paved central areas of the AISA.

B.11.2 Leach Bed LB-2

LB-2, in the southwestern portion of the present Aerojet site (Plate 4), consisted of three distinct areas immediately south of the magazine area known as the Special West Area. Leach Bed LB-2 is seen in 22 of the 48 aerial photographic prints reviewed by HLA for this work plan (Table 7). The western portion of LB-2 had surface dimensions of approximately 150 feet (east-west) by 80 feet (north-south). The dimensions in the middle portion of LB-2 was approximately 300 feet long (east-west) by 100 feet wide (north-south). The eastern portion of Leach Bed LB-2 was immediately west of the initial location of the IWTF (WT-1), and the dimensions of this portion of LB-2 were approximately 320 feet (north-south) by 50 feet (east-west).

Leach Bed LB-2 was constructed in approximately 1950 to collect surface water runoff and relatively uncontaminated water (i.e., water from such activities and equipment as cooling towers for air conditioning systems, non-contact cooling water, boiler blowdown, etc.) (*Aerojet 1988*, 104(e), page 91). Leach Bed LB-2 has also periodically received industrial waste effluent from the storm water collection system during "wet weather" (*Aerojet 1983*, 104(e), Exhibit 1, page 310). The industrial wastewater includes rinse water from a small plating plant with caustic and degreasing operations and wastewater from rocket fuel firing bays. During dry weather after the installation of the IWTF in 1952, industrial wastewater from the Aerojet facility was drained and treated at the onsite IWTF located immediately west of Building 185. Once treated at the IWTF, industrial wastewater was discharged to the City of Irwindale's industrial wastewater sewer system. The industrial wastewater treated at the IWTF included wastewater from plating and degreasing operations and also the collected wastewaters from the proving grounds associated with the rocket motor testing.

In 1961, engineers from the County of Los Angeles began to collect and analyze water samples from Leach Bed LB-2. The sampling was conducted to ensure that the liquids discharged to the leach beds conformed with Aerojet's industrial waste permit issued on May 19, 1961. The following constituents were analyzed: total dissolved solids, chloride, chloride and sulfate, nitrate, and hexavalent chromium. In September 15, 1961, the County of Los Angeles included maximum allowable concentrations for surface drainage of boron and fluoride in Aerojet's Industrial Waste permit. Subsequently, water samples collected from LB-2 by engineers from the County of Los Angeles were analyzed for these constituents. Measured concentrations of these constituents were below the maximum concentrations allowed to be discharged to the leach beds under the then existing permit.

B.11.3 Leach Bed LB-3

LB-3 was in the eastern portion of the AISA (Plate 4). HLA identified Leach Bed LB-3 on 16 of the 48 aerial photographic prints reviewed for this work plan (Table 7). The surface dimensions of the leach bed were approximately 200 feet (east-west) by 150 feet (north-south).

Leach Bed LB-3 was constructed between 1945 and 1947 to collect surface water runoff, relatively uncontaminated water and ring channel discharges (*Aerojet 1988*, 104(e), page 91). Aerial photographs indicate that between 1955 and 1957, LB-3 was regraded and Building 160 was constructed over LB-3, thus ending the leach bed's operation.

B.11.4 Leach Bed LB-4

Leach Bed LB-4 was located just west of the Special West Area and north of Leach Bed LB-2 (Plate 4). HLA identified Leach Bed LB-4 in 8 of the 48 aerial photographic prints reviewed for this work plan (Table 7). The surface dimensions of the leach bed were approximately 100 feet (north-south) by 70 feet (east-west).

Leach Bed LB-4 was identified in aerial photographs beginning in approximately 1963. This leach bed was used until approximately 1970 to contain wastewater from scrubber activities in Building 325 that removed aluminum dust from atmospheric vents in the building. Aerial photographs indicate that in approximately 1972, Leach Bed LB-4 and the surrounding area were graded and the immediately adjacent buildings were removed.

B.12 Leach Pits

Seven leach pit locations (LP-1 through LP-7) have been identified by the EPA within the boundaries of the AISA. Based on review of aerial photographic prints and the Aerojet 3007/104(e) response documentation, LP-1 and LP-2 have been identified as potential source locations. Leach pits LP-4 through LP-7 are pits associated with domestic wastes and are thus not identified as potential source locations. However, at the request of the EPA/RWQCB, LP-3, LP-6, and LP-7 have been incorporated into the AISA Site Assessment.

No industrial or domestic waste facilities existed at the site when it was established in 1942. Domestic wastes were disposed of using a combination of septic tanks, leach pits, and leach fields. The leach (seepage) pits were primarily used for sanitary disposal of domestic wastes and not for disposal of industrial and/or laboratory industrial wastes. In 1947, industrial wastes (excluding organics) from Building 16 operations were disposed of in a leach pit west of the building. It was the policy of the facility, as documented in 1947 (*Aerojet 1983*, 104(e), Exhibit 1, page 1), to separately collect organic wastes for subsequent disposal. Industrial waste treatment facilities were installed and connected to Aerojet buildings in 1952 to receive industrial wastes discharged during Aerojet's operations. The following subsections describe the location, period of operation, and uses of the leach and/or seepage pits.

B.12.1 Leach Pit LP-1

LP-1 occupied an area of approximately 15 feet square about 75 feet west of Building 16 (Plate 4). The pit was 10 to 15 feet deep and was filled with 3-inch-diameter crushed rock while in operation (*Aerojet 1983*, 104(e), Exhibit 1, page 4). LP-1 may have been capped with concrete (*Aerojet 1983*, 104(e), Exhibit 1, Drawing 9); however, in 1947 the city engineer for Azusa, California indicated that LP-1 was an open pit containing a solution of hydroxides and alkali metals (*Aerojet 1983*, 104(e), Exhibit 1, page 4). The surface outline of LP-1 is shown in 1 of the 48 aerial photographic prints provided by the EPA.

In 1947 it was proposed that Building 16 be changed from its original use as a first aid station and restroom to a chemical laboratory. At that time, Aerojet requested the L.A. County Sanitation District to approve the disposal of organic solvent wastes from the operations at Building 16 to LP-1. However, before disposal of organics from Building 16 began, Aerojet policy directed that solvents used at Building 16 would be collected in 55-gallon drums for later disposal. This solvent handling procedure for Building 16 was consistent with the regular solvent handling procedure throughout the facility. The industrial wastes disposed in LP-1 from Building 16 included alkali metals and some inorganic reagents excluding cyanides, chromium and fluorine (*Aerojet 1983*, 104(e), Exhibit 1, page 19).

In February 1949 Aerojet requested that liquid wastes from a proposed new laboratory Building (B-82) also be allowed to be disposed in LP-1. Inorganic wastes discharged in LP-1 from Building B-82 included: water soluble salts, acids, and bases, such as potassium perchlorate, sodium chloride, hydrochloric acid, and ammonia (*Aerojet 1983*, 104(e), Exhibit 1, page 21). The liquid wastes initially proposed to be disposed from Building B-82 also included cleaning solvents, such as naphtha and TCE. However, this proposed disposal of organic waste was against existing Aerojet policy for collecting, handling, and disposal of solvents (*Aerojet 1983*, 104(e), Exhibit 1, page 19). For this reason, to the best of Aerojet's knowledge, solvents were not disposed in this leach pit. Furthermore, analysis of a soil sample obtained from LP-1 at a depth of 10 feet in September 1983 did not detect TCE at a detection limit of 10 ppb.

Both Buildings 16 and B-82 were chemical laboratories used for small scale experiments in standard chemical research. The estimated total waste discharge from each building was approximately 100 gallons per day. According to the *Aerojet 1983* 104(e) response (Exhibit 6), both of the buildings were demolished in 1971, and thus the discharges to LP-1 ended before that date.

B.12.2 <u>Leach Pit LP-2</u>

LP-2 was designed to occupy an area of approximately 15 feet square approximately 25 feet northwest of Building 40 (Plate 4) (*Aerojet 1983*, 104(e), Exhibit 1, page 9). The pit itself was proposed to be approximately 10 feet deep and filled with 3-inch-diameter crushed rock while in operation. LP-2 was proposed to be covered with concrete. No evidence of LP-2 was observed in the 48 aerial photographs reviewed, and no documentation is available to confirm that LP-2 was actually built.

In 1947, Aerojet made a request to the City of Azusa and the Los Angeles County Engineer to drain wastewaters from Building 40 to the proposed Leach Pit LP-2. Building 40 was a chemical laboratory used for small-scale experiments that were part of conducted standard chemical research. This building contained only three sinks and one chemical vapor hood. Inorganic wastes to be discharged were similar to those discharged to LP-1 and included: alkali metals, water soluble salts, acids, and bases, such as potassium perchlorate, sodium chloride, hydrochloric acid, and ammonia (*Aerojet 1983*, 104(e), Exhibit 1, page 21). According to the *Aerojet 1983*, 104(e) response (Exhibit 6), Building 40 was demolished in 1970, thus ending any possible discharge to LP-2, if LP-2 was ever constructed.

B.12.3 Leach Pit LP-3

LP-3, as identified by the EPA in the *SOW*, would have been immediately south of Building 56. This building was identified as a physical science laboratory (*Aerojet 1983*, 104(e), Exhibit 1, page 112). In a letter dated April 28, 1950, Aerojet requested that industrial waste effluent be discharged from Building 56 to a 25-foot-deep leach pit south of the building (*Aerojet 1983*, 104(e), Exhibit 1, page 112). The original intent of this request was to discharge effluent that consisted of both organic and inorganic wastes. However, on May 8, 1950, Aerojet indicated that the disposal of the industrial wastes from Building 56 would be to Building 26, until the plant's industrial waste treatment system was connected. In 1950 the industrial waste from Building 26 was discharged to the ditch used for the disposal of industrial waste in the area

(*Aerojet 1983*, 104(e), Exhibit 1, page 115). Thus, it appears likely that LP-3 was never built.

The industrial wastes discharged from Building 56 at times contained trace amounts of various acids, alkalies, organic solvents, and boron compounds. The concentrations of these chemicals the discharge were dilute and not considered to interfere with the bacterial action in the sewer system (*Aerojet 1983*, 104(e), Exhibit 2, page 2). In 1957, as-built drawings indicate that the industrial waste treatment lines from Building 56 were connected to Aerojet's industrial waste treatment facility (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 2). Therefore, even if LP-3 had been built it would have only been used for domestic waste and its use for draining domestic waste would have terminated prior to creation of the 1957 as-built drawings.

B.12.4 Leach Pit LP-4

LP-4 as identified by the EPA in the *SOW*, consisted of four leach pits between Buildings 118 and 119 (Plate 4). These leach pits (leach fields) were associated with two septic tanks that received domestic wastes from Buildings 118 and 119. These buildings are referred to as stores and office buildings in Aerojet's 104(e) response (Exhibit 6). The rooms in Building 118 consist of storage, inspection, shipping and receiving, and offices (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 10). The floor plans for Building 119 indicate that the building consists of the following rooms: stationery stores, mailroom, offices and a telephone equipment room (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 11).

Aerial photographs indicate that Buildings 118 and 119 were constructed between 1945 and 1947. At this time the Aerojet site had no sewer service within its boundaries and domestic wastes were drained to the septic tank and leach pit system. In 1956 through 1957, the City of Azusa's domestic sewer system was connected to buildings throughout the majority of the plant including Buildings 118 and 119 (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 3). Subsequently, septic tanks were pumped and filled with clean sand.

B.12.5 Leach Pit LP-5

Leach Pit LP-5 as identified by the EPA in the *SOW*, consisted of eight leach pits south of Building 59. These leach pits (leach fields) were associated with two septic tanks that received domestic wastes from Building 59, referred to as an office building in Aerojet's 104(e) response (Exhibit 6). The rooms within Building 59 consist of a mezzanine, equipment room, general offices, and computer area storage (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 7).

Building 59 was constructed in approximately 1952. In 1952, construction of a domestic sewer line from the City of Azusa's sewer system was investigated for Building 59. At this time the Aerojet site had no sewer service within its boundaries and domestic wastes were drained to the septic tank and leach pit system. In 1956 through 1957, the City of Azusa's domestic sewer system was connected to buildings throughout the majority of the plant (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 29). After Building 59 was connected to the City sewer system, the septic tanks were pumped and filled with clean sand.

B.12.6 Leach Pit LP-6

LP-6 as identified by the EPA in the *SOW*, consisted of four leach pits south of Buildings 141 and 63 (Plate 4). These leach pits (leach fields) were associated with two septic tanks that received domestic wastes from Buildings 63 and 141. Buildings 63 and 141 are referred to as "machine tool repair" and "cafeteria" buildings in the Aerojet's 104(e) response (Exhibit 6). The rooms within Building 141 consist of a dining area, dishwasher, kitchen, and serving rooms (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 7). Aerial photographs indicate that Buildings 63 and 141 were constructed immediately prior to 1947 and 1951, respectively. At this time the Aerojet site had no sewer service within its boundaries and domestic wastes were drained to the septic tank and leach pit systems associated with each respective building. In 1956 through 1957, the City of Azusa's domestic sewer system was connected to buildings throughout most of the plant including Buildings 63 and 141 (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 2). Subsequently, the septic tanks were pumped and filled with clean sand.

B.12.7 Leach Pit LP-7

Table 2-2 in *SOW* indicates that LP-7 consisted of six leach pits located between Buildings 17, 63, and 170 (Plate 4). However, these building numbers are inconsistent with the area indicated in Figure 2-1 of the *SOW*. Using the information from Figure 2-1 and the number of leach pits indicated in Table 2-2 of the *SOW*, it appears that these six leach pits are instead between Buildings 7, 53, 109, and 110. These leach pits were associated with two septic tanks that received domestic wastes from Buildings 53, 109 and 110. Building 53 is referred to as comprising physical measuring/research labs and office space in Aerojet's 3007/104(e) response documentation (1983, Exhibit 6).

The rooms within Building 53 consist of an extrinsics lab, a wet chemistry laboratory, and photoetching and plating laboratory rooms (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 6).

Buildings 109 and 110 are each referred to as a mixing station/office (Aerojet 104(e), Exhibit 6). Aerial photographs indicate that Building 63 and 141 were constructed immediately prior to 1947 and 1951, respectively. At this time the Aerojet site had no domestic sewer service within its boundaries and domestic wastes were drained to septic tank and leach pit/field systems associated with each respective building. In 1956 through 1957, the City of Azusa's domestic sewer system was connected to buildings throughout the majority of the plant, including Buildings 63 and 141 (*Aerojet 1983*, 104(e), Exhibit 2, Drawing 2). Following the connection of the City of Azusa's domestic sewer system to Buildings 63 and 141, the previously used septic tanks and leach pits were pumped and filled with clean sand.

B.13 Drainage Courses

Three specific surface water drainage courses (designated DG-1 through DG-3) and one drainage basin (designated B-1) were identified in the *SOW*. These drainage courses, located at the southern edge of the AISA, controlled stormwater runoff, which in general flowed from north to south in the AISA. During periods of runoff, some surface water ponded in the area designated B-1. On the basis of a review of aerial photographic prints, and apparently hypothesizing a potential that surface runoff from testing areas and leach beds/pits may have reached drainage courses DG-1, DG-2, and DG-3, EPA originally identified these drainage courses as potential source areas. Because up to 170 feet of material beneath basin B-1 and the southern portion of DG-1 has been excavated during gravel and sand mining activities, these areas have not been identified as potential source areas.

B.13.1 Drainage Course DG-1

Former drainage course DG-1 (Plate 4) was located in the south-central portion of the AISA along the southern edge of the Proving Grounds. The southern portion of DG-1 was located on property leased from Azusa Rock and Sand (ARS) by Aerojet. The DG-1 course is shown on 25 of the 48 photographic prints provided by EPA.

Based on review of the photographs, it appeared that DG-1 controlled the flow of runoff from a portion of the central AISA, including a portion of the Proving Ground area, and channeled surface water into drainage basin B-1 (see Section B.13.4 below).

The estimated former surface elevation along the southern portion of DG-1 (located on leased ARS property) ranged between 540 and 550 feet mean sea level (msl). Because of significant excavation of materials during rock and sand mining in this area, the current range of surface elevations in this area is 375 to 550 feet msl. Hence, up to approximately 170 feet of material that once existed below DG-1 has been removed. The surface location directly below the southern portion of former drainage course DG-1 currently lies on a slope with an approximate 50 percent grade, making the area, now below former DG-1, very difficult if not impossible to access.

B.13.2 Drainage Course DG-2

DG-2 (Plate 4), located along the south edge of the eastern AISA, is seen on 1 (1985) of the 48 photographic prints provided by EPA. On the basis of the review of this and earlier photographs, it appears that DG-2 has only been in existence since approximately 1980. This drainage course only receives rainwater runoff from an eastern parking lot at the Aerojet facility, and channels surface water into a surface depression (PL-4) east of the Aerojet facility (see PL-4). Therefore, DG-2 is not considered to be a potential source.

B.13.3 Drainage Course DG-3

DG-3 (Plate 4) was located at the southern edge of the western AISA. DG-3 is seen on 2 (1945, 1948) of the 48 photographic prints provided by EPA, and was located south of the Aerojet property line at that time. Review of the photographs indicates that DG-3 channeled surface water runoff from a portion of relatively undeveloped property owned and/or occupied by Day and Night Manufacturing Company and a very limited area of the westernmost Aerojet facility.

B.13.4 Basin B-1

Former basin B-1 (Plate 4) was in the southernmost portion of the AISA, south of the Proving Grounds, on property leased from Azusa Rock and Sand (ARS) by Aerojet. The B-1 area is shown on 13 of the 48 photographic prints provided by EPA, two of which (EPA Prints 15 and 23) may show the presence of ponded water. Review of the photographs indicates that B-1 was located at the downstream end of drainage course DG-1 (see DG-1) and likely ponded surface runoff originating, at least in part, from the Aerojet facility.

The estimated original surface elevation of B-1 was 540 to 550 feet msl. Because of significant excavation of material during rock and sand mining in this area, the current surface elevation of this area is 375 feet msl. Hence, B-1 and approximately 170 feet of material that once existed below B-1 has been removed. The surface directly below former basin B-1 currently lies on a slope with a grade of up to approximately 50 percent, making the area very difficult if not impossible to access.

B.14 PCB Transformers

In 1982, all eight transformers at the Aerojet Azusa facility containing polychlorinated biphenyls (PCBs) were drained and flushed, and seven were refilled with Dow Corning 561 silicone-based transformer fluid. One transformer was sent to offsite Class I landfill for disposal by burial. The PCB waste (Askarel fluid) was sent to an approved offsite disposal site. Subsequently, filtering has been performed to further lower the residual PCB levels in the remaining transformers to below 50 ppm. The seven remaining transformers are located at Buildings 59, 160, 160A, 170, 179, 183, and 200 (Plate 4). As of September 1990, only two transformers contained PCB concentrations above 50 ppm and will require additional filtering and testing (transformer at Building 160, 51 ppm; transformer at Building 170, 65.9 ppm). (*Aerojet 1983*, 104(e) page 32 and Exhibit 4).

B.15 E.K. Metzner Automobile Wrecking Yard

The former Metzner Property automobile wrecking yard (Plate 4) was operated in the western portion of the AISA between approximately 1963 and 1975. The wrecking yard, identified on 12 of the 48 aerial photographic prints provided by EPA, was an unpaved and uncovered area of approximately 1 acre that contained over 150 wrecked cars, trucks, and piles of junked automotive engines, frames, and bodies in 1963. Two small buildings were identified along the western fenceline of the yard, and the soil visible between the wrecked vehicles, junk piles, and buildings is darkly discolored throughout much of the yard. This property was never owned or occupied by Aerojet. No information regarding potential fuel and/or solvent storage or use on the property or waste handling at the facility was found.

B.16 E.K. Metzner Go-Cart Raceway

The former Metzner Property go-cart raceway (Plate 4) was operated in the northwest corner of the AISA between approximately 1959 and 1975. The raceway is seen on 15 of the 48 aerial photographic prints provided by EPA. The race track was an uncovered area approximately 5 acres in size, and included a parking lot and two buildings north of the track in 1963. This property was never owned or occupied by

Aerojet. No information regarding potential fuel and/or solvent storage or use on the property or waste handling at the facility was found.

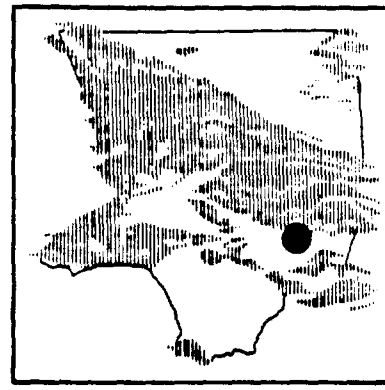
APPENDIX C

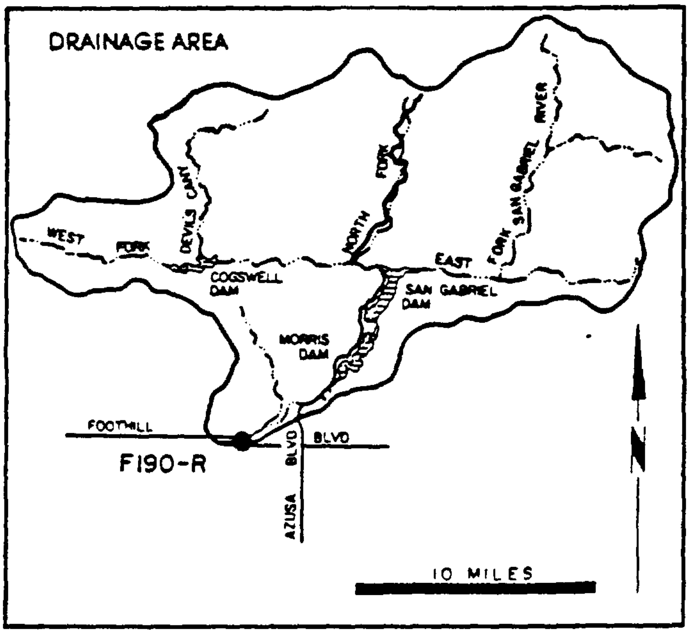
Appendix C

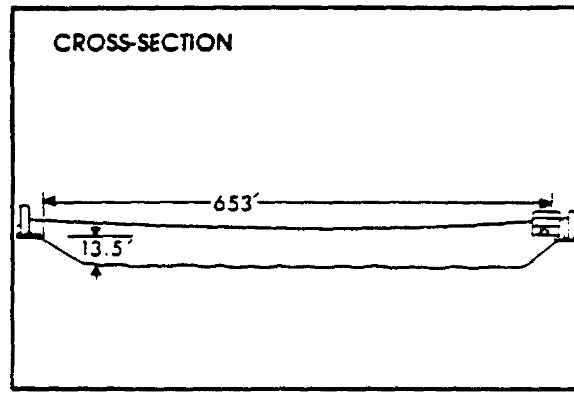
HYDROLOGIC DATA

STREAM FLOW DATA

SAN GABRIEL RIVER
at Foothill Boulevard
STATION NO. F190-R







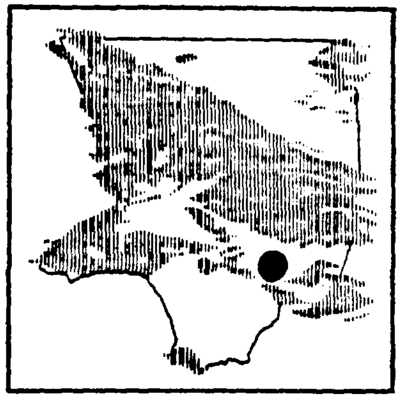
RECORDER- continuous water stage.
METHOD OF MEASUREMENTS- wading or from cable car.
DRAINAGE AREA- 230.0 square miles.
LOCATION- downstream side of Foothill Boulevard bridge, 2.0 miles west of Azusa.
REGULATION- partially regulated by Cogswell, San Gabriel, and Morris Dams.
CHANNEL- sand, gravel and rock,trapezoidal section with soft bottom.
CONTROL- gunited rock stabilizers.
LENGTH OF RECORD- February 22, 1932 to date.
REMARKS- flows may include imported water originating at the Metropolitan Water District outlet below Morris Dam.

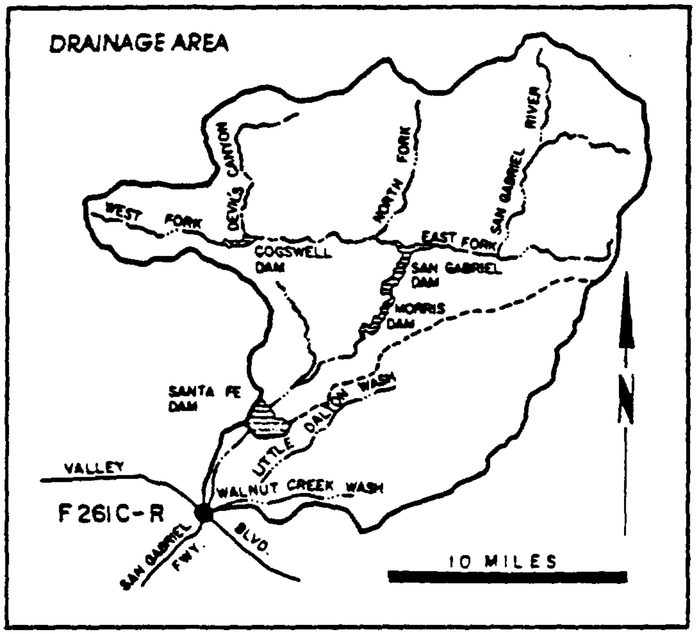
WATER YEAR : 1988 - 89
(DISCHARGE IN SEC-FT)

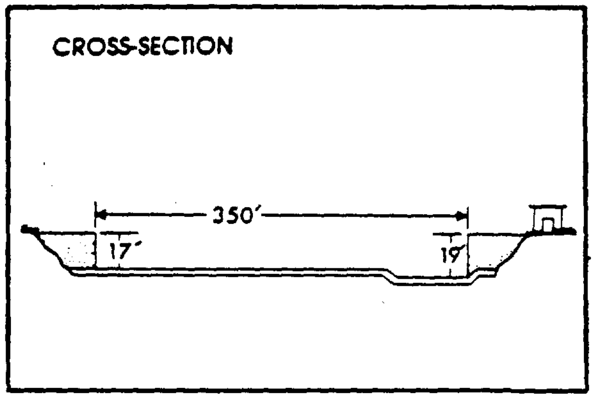
STATION NO. : F190-R DRAINAGE AREA : 230.00 SQ. MI.

		OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
WATER YEAR 88-89	MEAN	9.3	6.3	113.0	156.0	155.0	59.8	49.9	22.4	5.9	5.6	9.3	8.7
	MAX.	53.4	22.6	358.0	417.0	464.0	144.0	67.2	35.9	248.0	17.3	22.4	25.8
	MIN.	0.0	0.0	0.0	0.0	84.1	4.2	38.8	1.2	0.0	0.0	0.0	0.0
	TOTAL AF	573.0	376.0	6960.0	9572.0	8600.0	3677.0	2968.0	1381.0	352.0	347.0	570.0	520.0

SAN GABRIEL RIVER
below Valley Boulevard
STATION NO. F261C-R







RECORDER- continuous water stage.
METHOD OF MEASUREMENTS- wading.
DRAINAGE AREA- 118.0 square miles (excludes area above Santa Fe Dam).
LOCATION- 1,150.0 feet below Valley Boulevard, 2.5 miles east of El Monte.
REGULATION- partly regulated by Santa Fe, Big Dalton, Puddingstone Diversion, and Puddingstone Dams.
CHANNEL- sand and gravel bottom with rip-rap side slopes; trapezoidal section.
CONTROL- concrete stabilizer with low-flow notch.
LENGTH OF RECORD- at Station F261-R March 11, 1937 to September 30, 1941. at Station F261B-R October 1, 1941 to April 23, 1946. at Station F261C-R November 29, 1960 to date.
REMARKS- flows may include imported water originating at Metropolitan Water District outlets at San Dimas Canyon and below San Bernardino Road.

WATER YEAR : 1988 - 89
(DISCHARGE IN SEC-FT)

STATION NO. : F261C-R DRAINAGE AREA : 118.00 SQ. MI.

		OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
WATER YEAR 88-89	MEAN	1.5	18.3	136.0	111.0	167.0	105.0	110.0	34.4	93.8	1.3	2.7	7.8
	MAX.	8.2	209.0	704.0	264.0	569.0	355.0	124.0	122.0	196.0	10.6	11.7	81.7
	MIN.	0.0	0.2	1.7	0.6	7.5	0.0	68.5	0.0	0.0	0.0	0.0	0.0
	TOTAL AF	94.8	1089.0	8392.0	6827.0	9249.0	6446.0	6530.0	2112.0	5768.0	82.5	167.0	466.0

OPERATIONAL DATA
SANTA FE RESERVOIR SPREADING GROUNDS

SUMMARY OF DATA ON SANTA FE RESERVOIR SPREADING GROUNDS

Type	Season First Used	Area in Acres		Capacities			Location	Source of Water
		Gross	Wetted	Intake CFS	Storage A.F.	Percolation* CFS		
Shallow and Medium Depth Basin	1953-54	338	111	400	200	400	Within Santa Fe Dam Reservoir and Spillway Areas	Controlled flows from San Gabriel Canyon and un-controlled flows from Bradbury Channel and San Gabriel River below Morris Reservoir

* The capacities listed are based on infiltration rates which may be expected to persist for at least five days but are not valid for sustained spreading operations

Modified from: Los Angeles County Department of Public Works (DPW), 1990. Hydrologic Report 1988-89. April.

Water Conserved for
Water Year: 1988-1989
(in acre-feet)
Santa Fe Reservoir Spreading Grounds

OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	ACCUMULATIVE TOTALS
317.6	98.0	12.0	228.0	240.0	0.0	0.0	216.0	34.0	0.0	0.0	0.0	1,145.6

Modified from: Los Angeles County Department of Public Works (DPW), 1990. Hydrologic Report 1988-89. April.

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AZUSA/IRWINDALE STUDY AREA SITE ASSESSMENT
SAN GABRIEL VALLEY
LOS ANGELES COUNTY, CALIFORNIA
September 17, 1991

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QUALITY CONTROL REVIEWER

James G. McClure, Ph.D.
Civil Engineer - 33809